



Other Organs In Abdominal Cavity

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Lecture (4) – Last updated: May 2013

Objectives:

- **Basic anatomy, to identify:**
 - Locations, shapes and anatomical relations of the liver, gallbladder, pancreas and spleen.
- **Surface anatomy, to identify:**
 - Where to palpate for the liver.
 - Location of the spleen.
- **Clinical anatomy, to define:**
 - Hepatomegaly.
 - Splenomegaly.
- **Radiology, to define:**
 - ERCP.
 - Abdominal CT.

Think About This

- Nuha is 35 years-old house wife with three kids presented to the ER in Khartoum hospital with severe abdominal pain, she described it as severe but constant pain, with a crescendo characteristic. She also mentioned that the pain is recurrent and related the symptoms to food that particularly has a high fat content. The pain was in the epigastrium and over the right shoulder, she suffered from nausea and vomiting as well.
- The doctor requested some investigations, abdominal X-ray and abdominal ultrasound scan and reached the diagnosis: gallstones.
- According to the doctor's advice, she booked for Cholecystectomy.

By The End Of This Lecture, Try To Answer These Questions About The Previous Story:

- 1. Mention the surface anatomy for the gallbladder.**
- 2. Why did she feel pain at her right shoulder?**
- 3. Name and describe the incision for cholecystectomy.**
- 4. Describe the Clot's triangle.**
- 5. Mention the importance of Clot's triangle.**

Introduction: Lecture's map

- **Liver.**
- **Biliary system.**
- **Pancreas.**
- **Spleen.**

LIVER

- **Definition and location.**
- **Surfaces.**
- **Parts and divisions.**
- **Blood supply.**

It is the largest gland in the body and the second largest organ after the skin

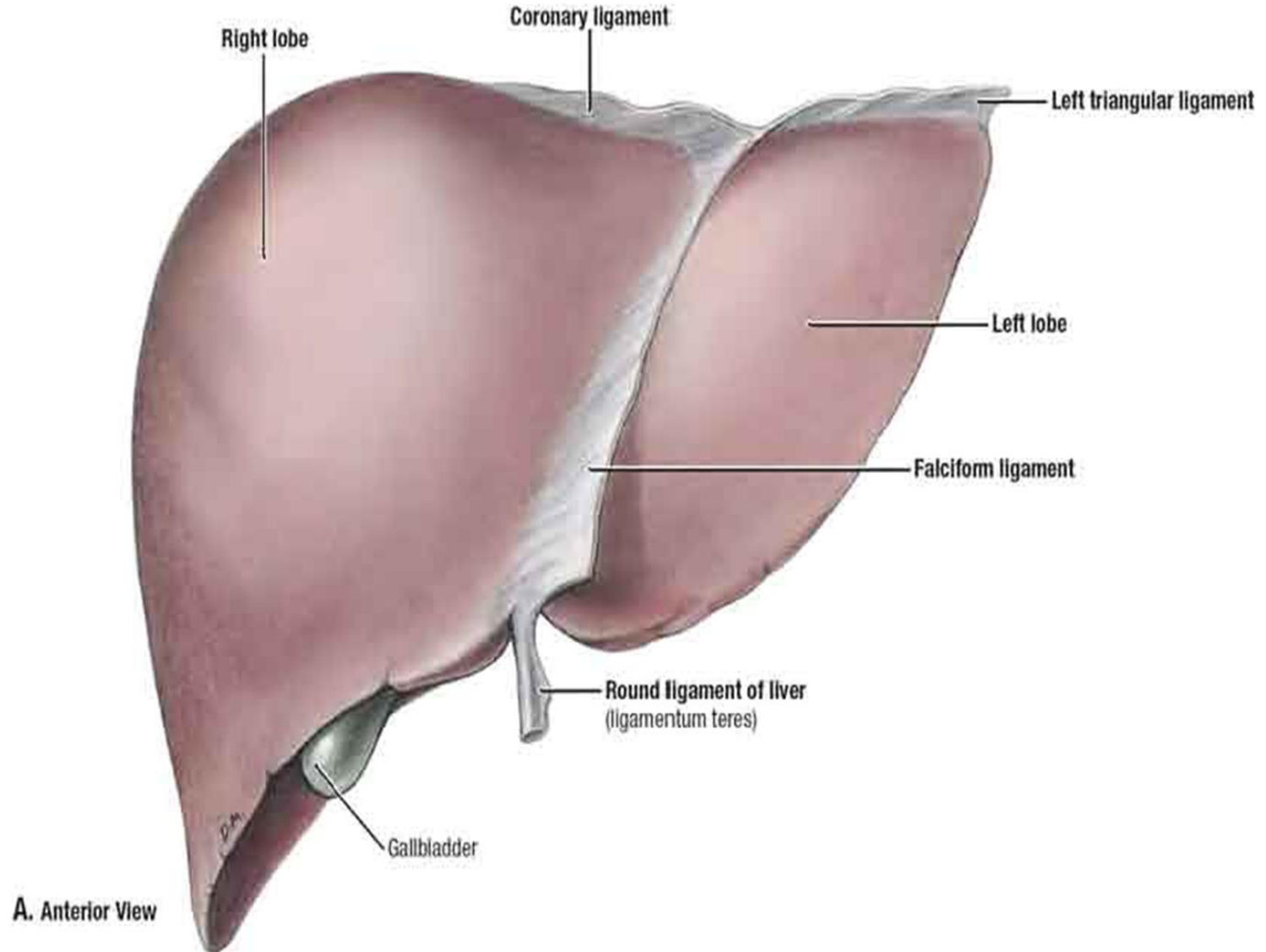
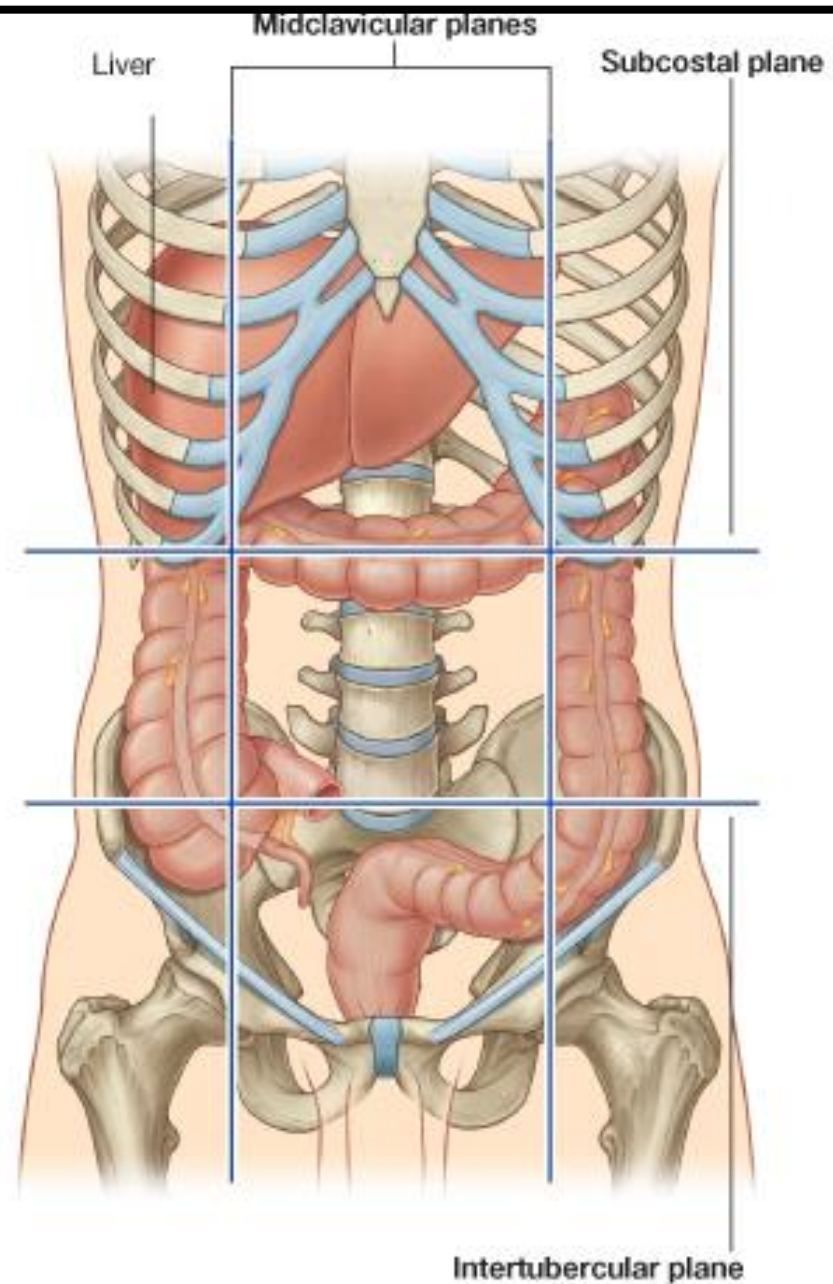


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Location



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LIVER

- Definition and location.
- **Surfaces.**
- **Parts and divisions.**
- **Blood supply.**

Surfaces Of The Liver:

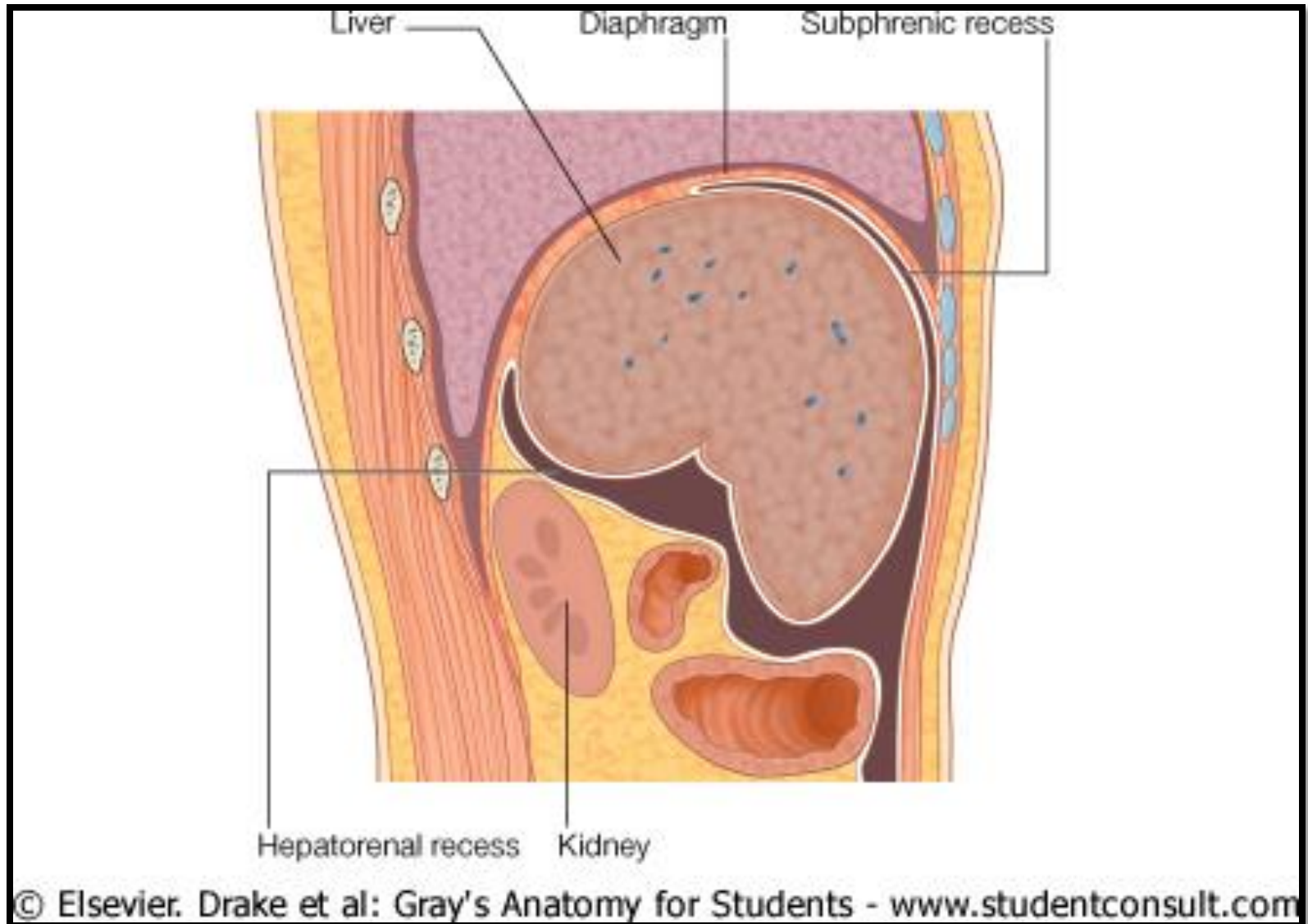
- **Diaphragmatic surface:**

- Anterior.
- Superior.
- Posterior.

- **Visceral surface**

- In the inferior direction.

Subphrenic and hepatorenal recesses



The subphrenic recesses are separated into right and left recesses by the falciform ligament

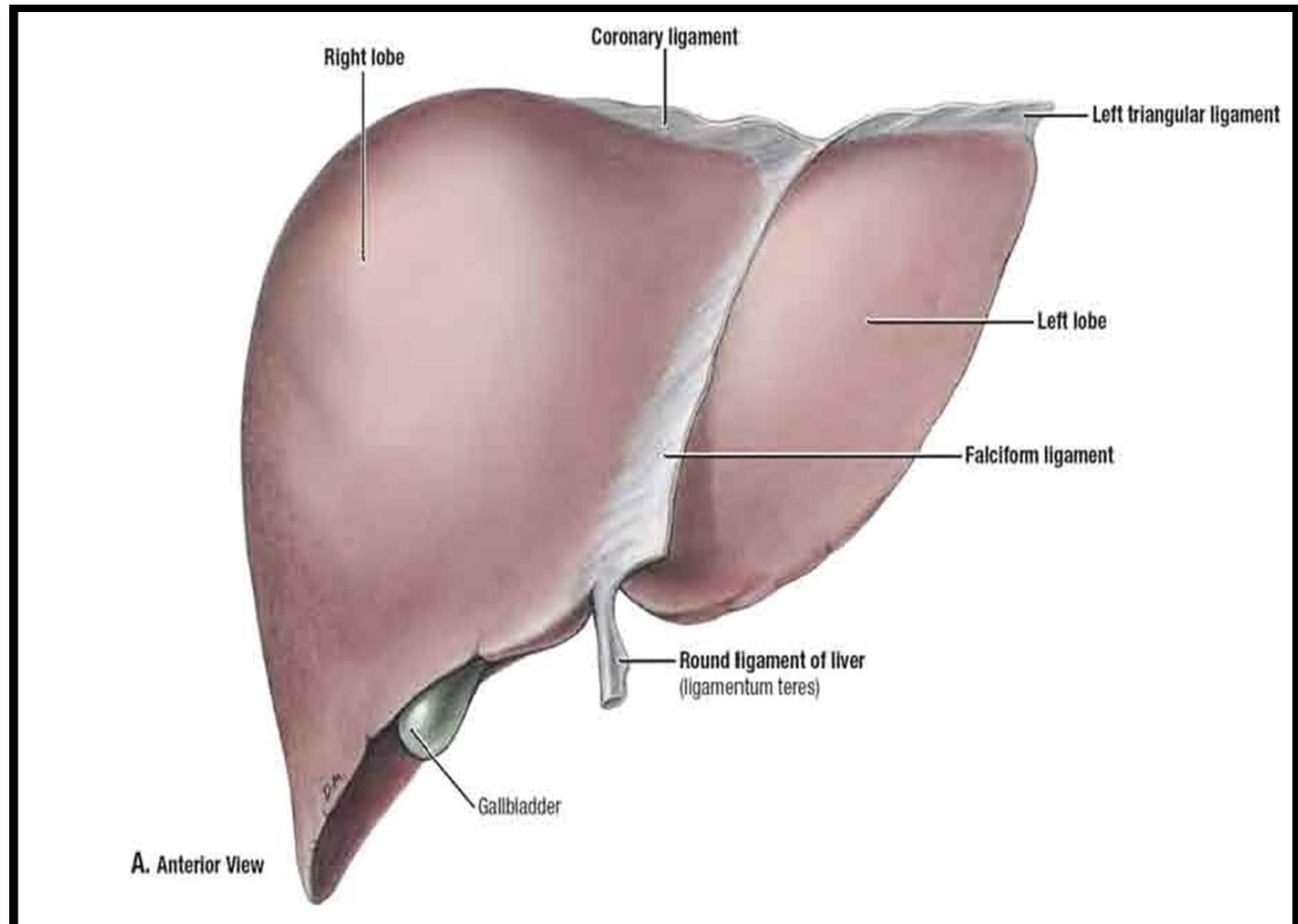


Image from: Moore, Keith L.; Dalley, Arthur F, Clinically Oriented Anatomy, 5th Ed. Lippincott Williams & Wilkins; 2006.

The Bare Area Of The Liver (I)

- **The diaphragmatic surface of the liver is covered with visceral peritoneum, except posteriorly, where it lies in direct contact with the diaphragm.**

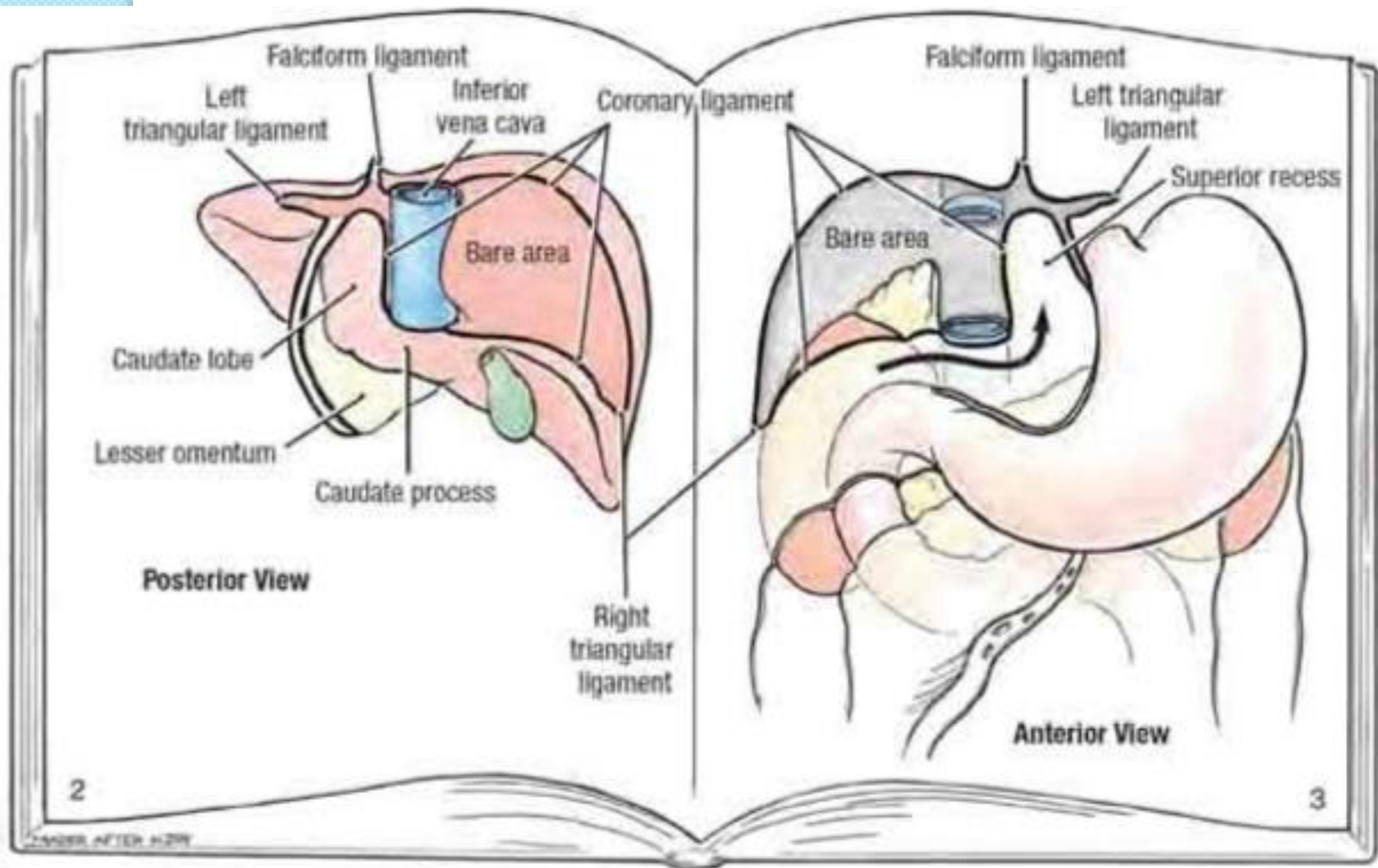


Image from: Agur, Anne M.R.; Dalley, Arthur F. Grant's Atlas of Human Anatomy. 12th Ed. Lippincott Williams & Wilkins; 2009.

The Bare Area Of The Liver (2)

- **Demarcation: The coronary ligament:**
 - **The anterior (upper) layer:**
 - It continuous on the left with the right layer of the falciform ligament.
 - **The posterior (lower) layer:**
 - It continuous with the right layer of the lesser omentum.

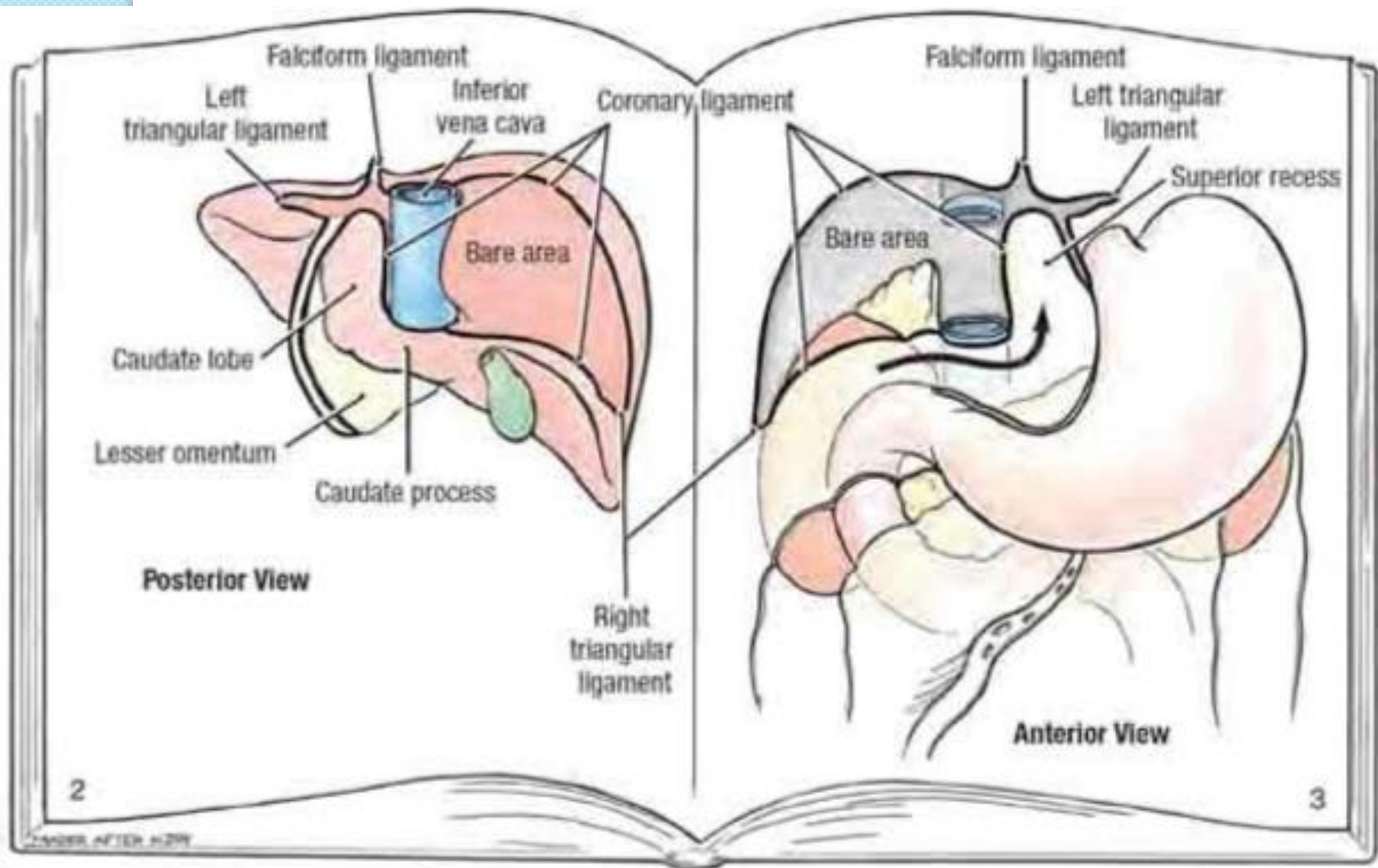
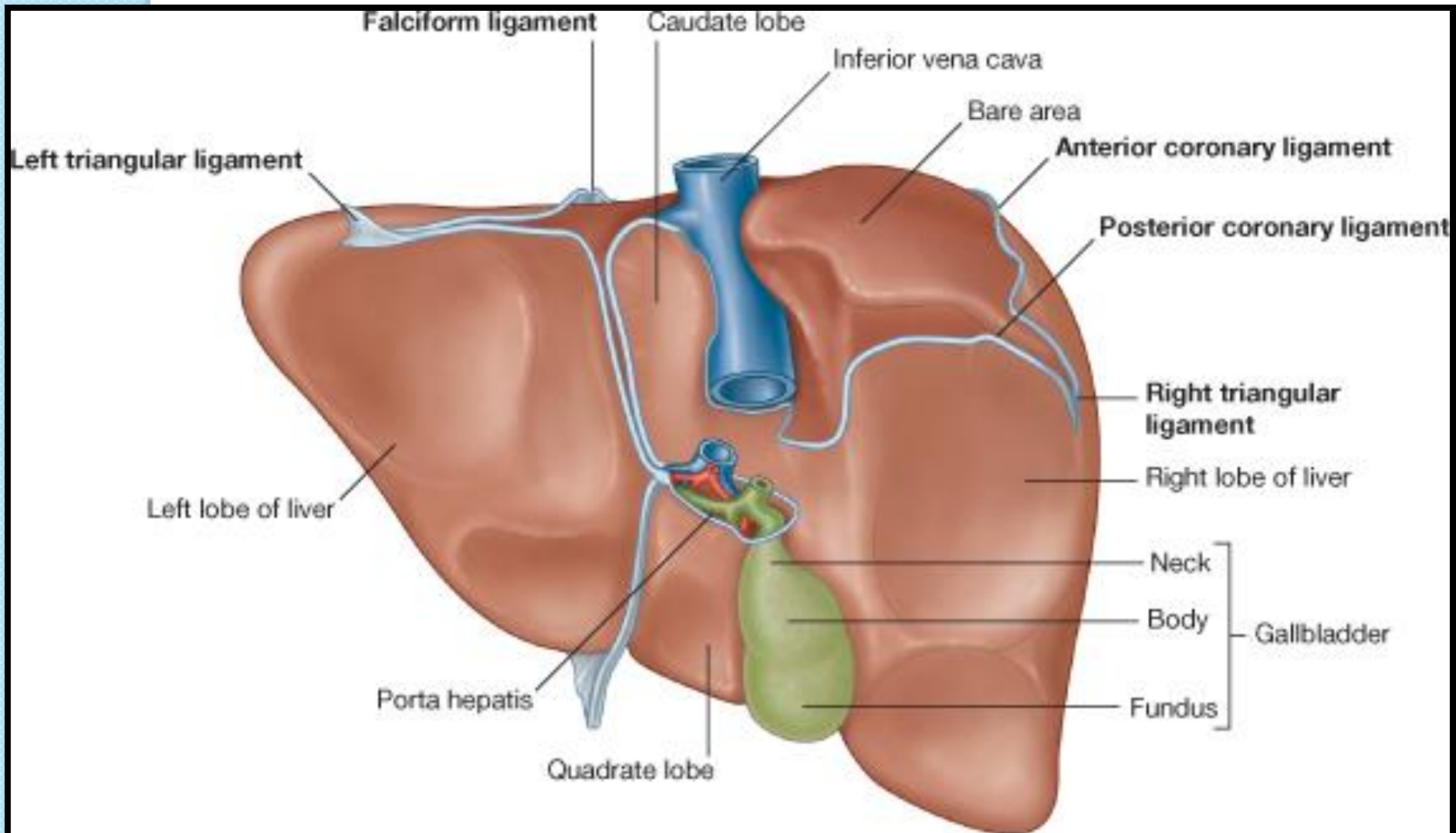


Image from: Agur, Anne M.R.; Dalley, Arthur F. Grant's Atlas of Human Anatomy. 12th Ed. Lippincott Williams & Wilkins; 2009.

The Bare Area Of The Liver (3)

- **Demarcation: The coronary ligaments:**
 - **On the left side of the liver:**
 - Both layers of the left part of the coronary ligament meet to form the left triangular ligament.
 - **On the right side of the liver:**
 - Both layers meet on the right to form The right triangular ligament.

The visceral surface of the liver is covered with peritoneum , except at the fossa for the gallbladder and the porta hepatis



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Impressions On The Visceral Surface

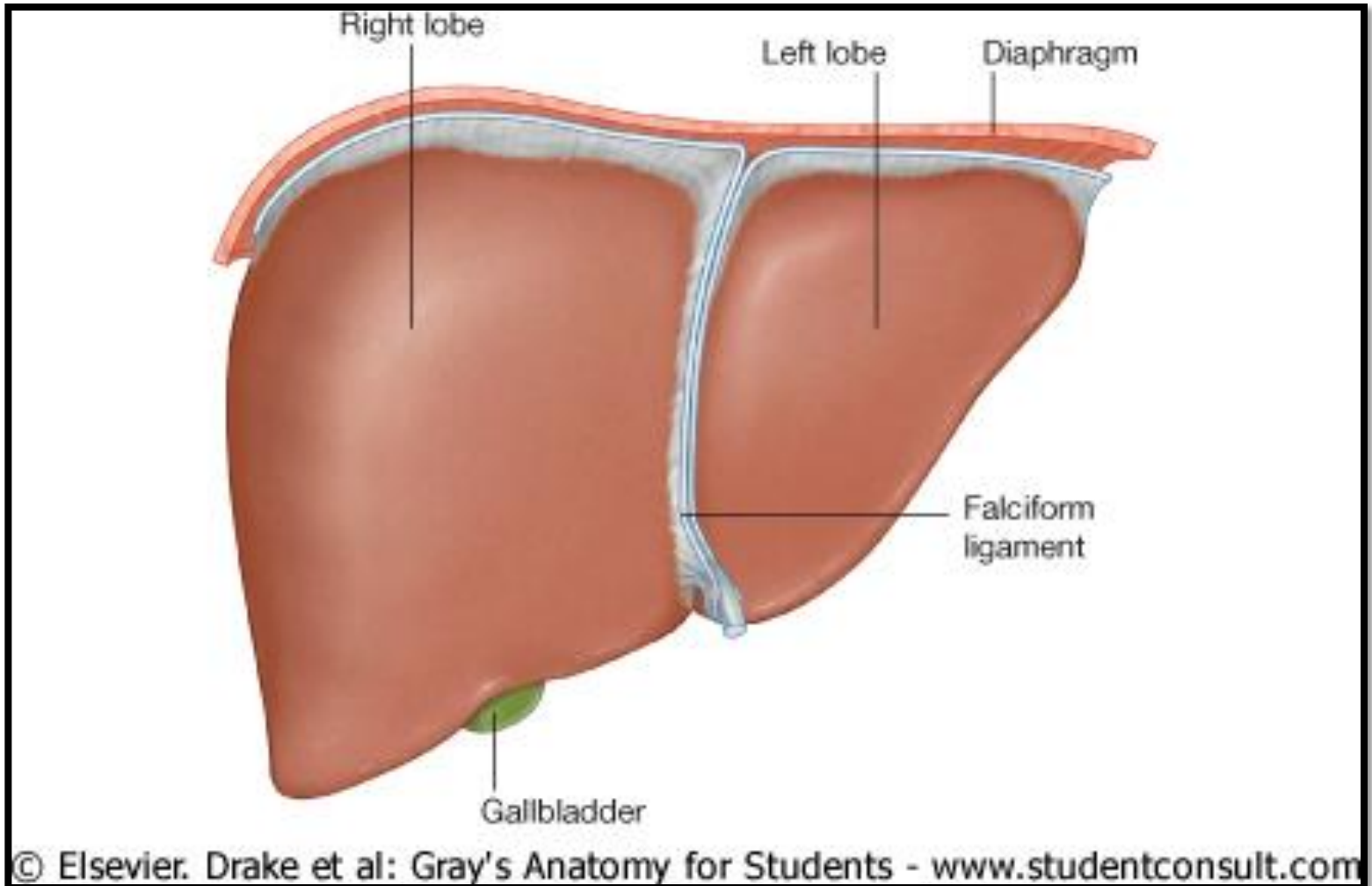
- **Right side of the anterior aspect of the stomach.**
- **Superior part of the duodenum.**
- **Lesser omentum.**
- **Gallbladder.**
- **Right colic flexure and right transverse colon.**
- **Right kidney and suprarenal gland.**

LIVER

- Definition and location.
- Surfaces.
- **Parts and divisions.**
- **Blood supply.**

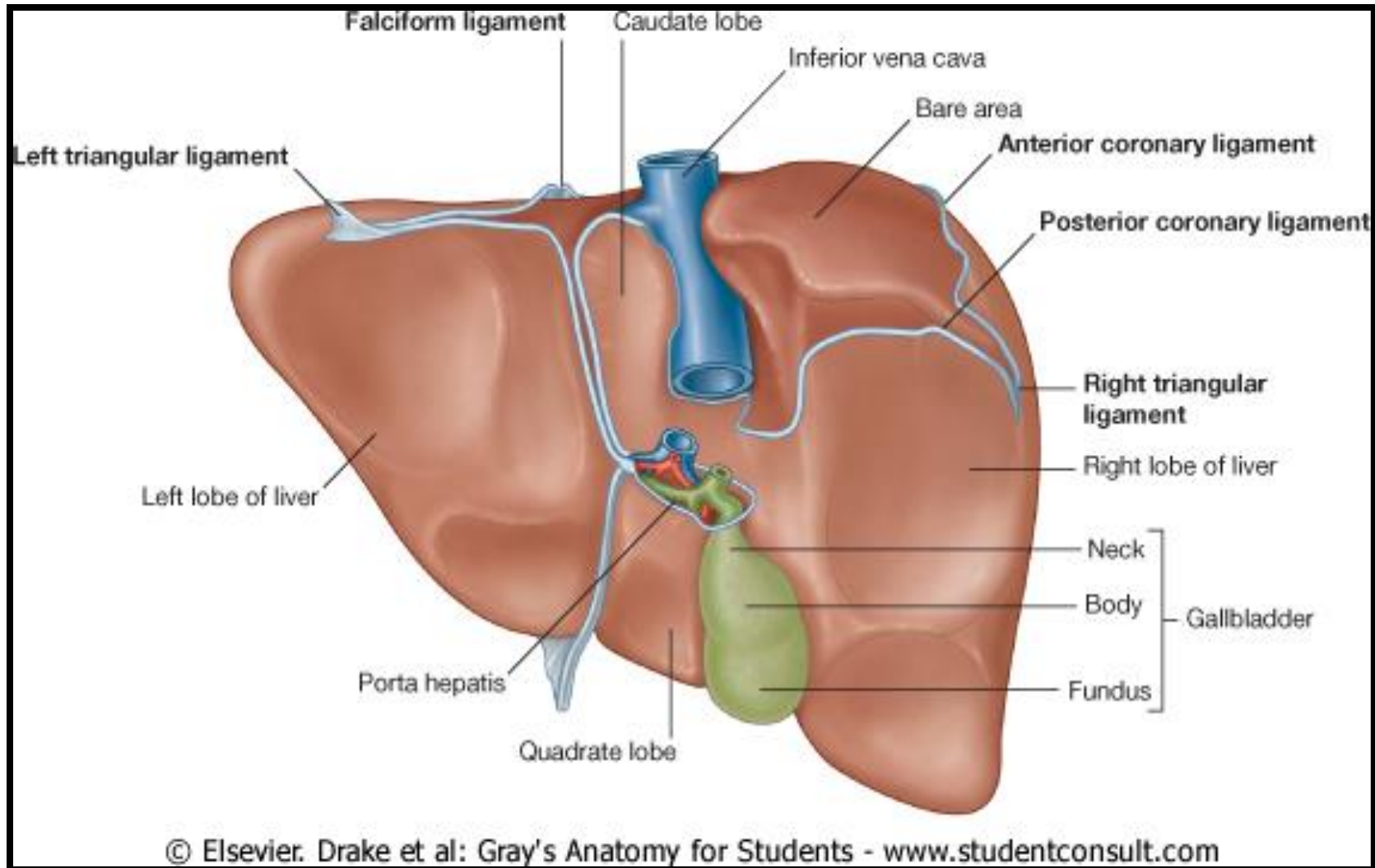
Lobes of the liver

(as they appear in the anterior aspect of the diaphragmatic surface)



Lobes of the liver

(as they appear in the visceral (inferior) surface)



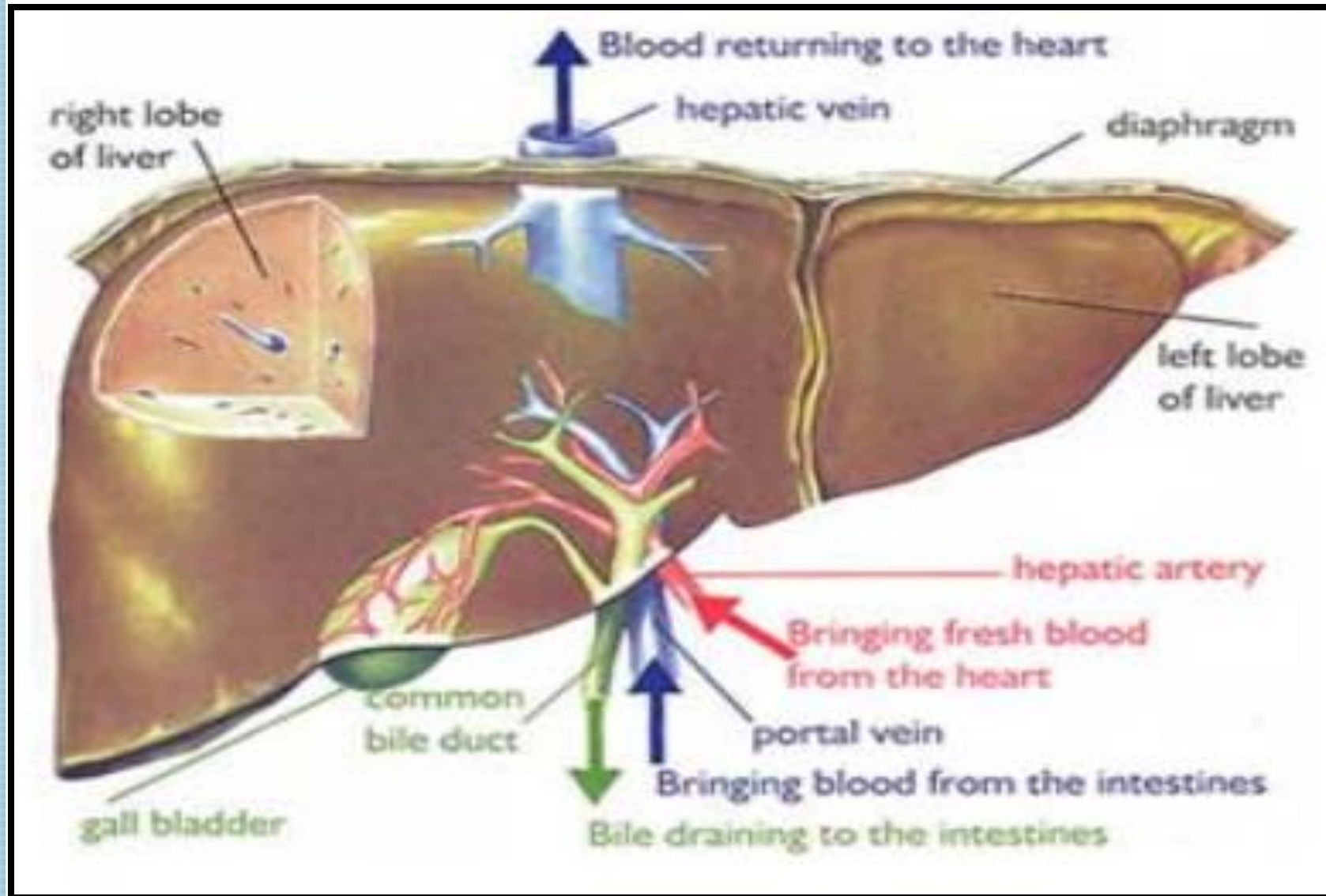
Functional Subdivision of the Liver

- **It has functionally independent right and left livers that are much more equal in size than the anatomical lobes.**
- **The caudate lobe may be considered a third liver.**
- **Each part receives its own primary branch of the hepatic artery and portal vein and is drained by its own hepatic duct.**

LIVER

- Definition and location.
- Surfaces.
- Parts and divisions.
- **Blood supply.**

Blood and Bile flow





**The liver, like the lungs,
has a dual blood supply
(afferent vessels):
a dominant venous
source and a lesser
arterial one.**

Blood and Bile flow

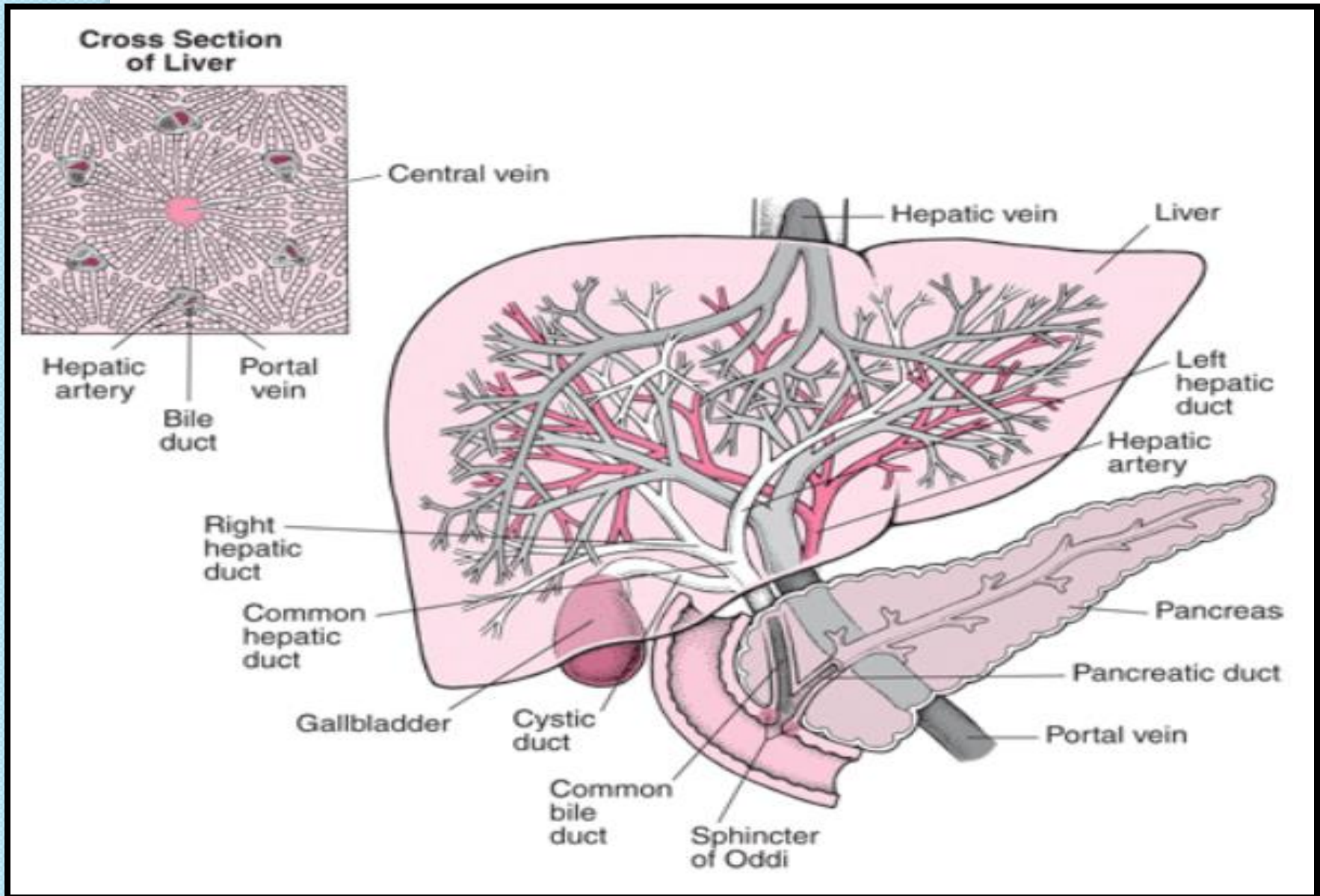
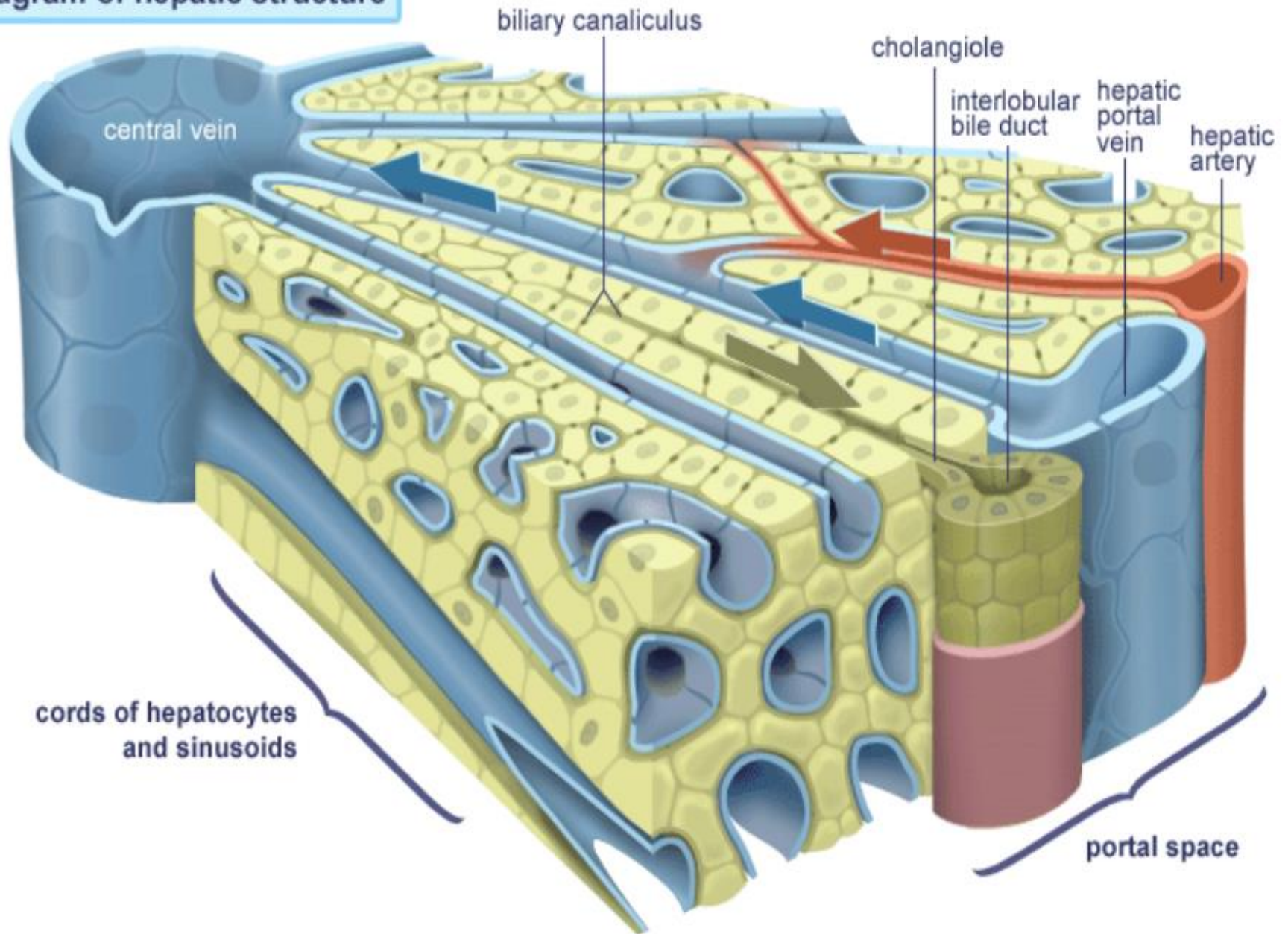


Diagram of hepatic structure



Clinical Note: Hepatomegaly

- **Any rise in central venous pressure is directly transmitted to the liver, which enlarges as it becomes engorged with blood.**
- **When the liver is massively enlarged, its inferior edge may be readily palpated below the right costal margin.**

Surface anatomy: palpation of the liver (I)

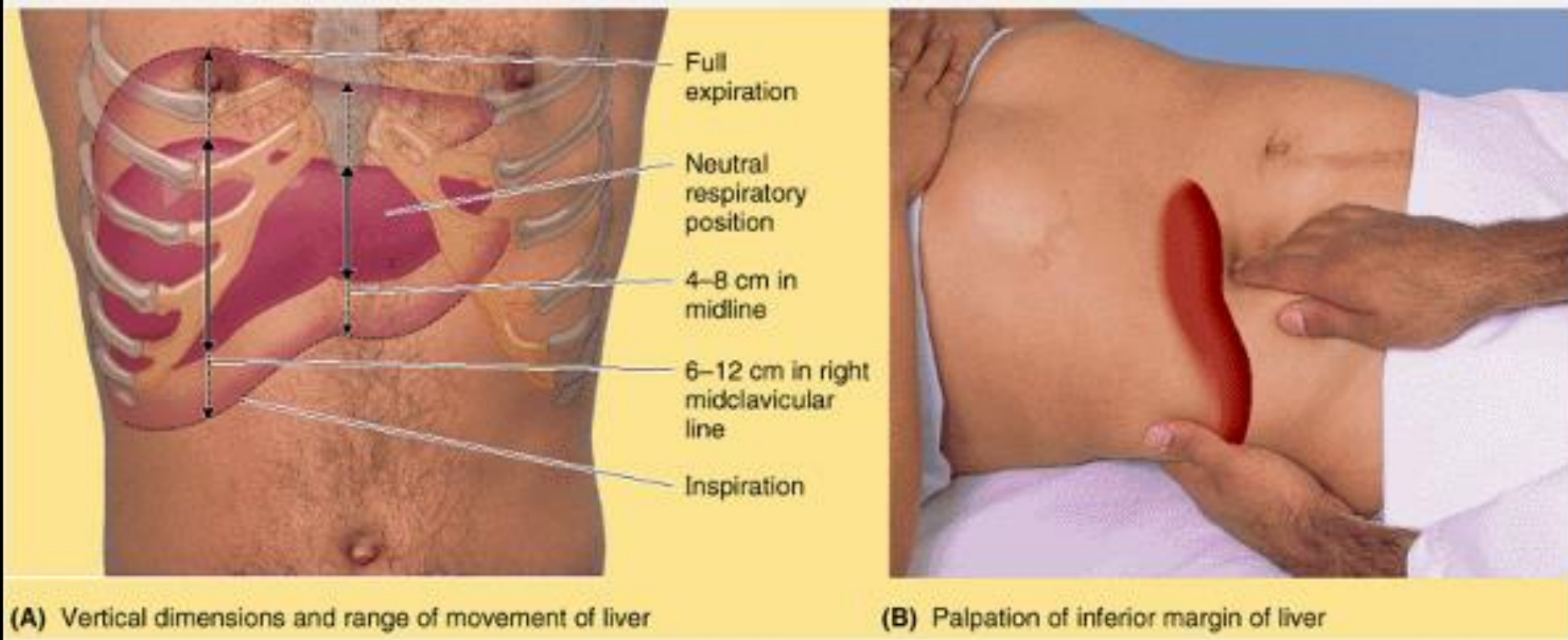


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Surface anatomy: palpation of the liver (I)

- **The normal liver lies deep to ribs 7 to 11 on the right side and crosses the midline toward the left side.**
- **It occupies most of the right hypochondrium, the upper epigastrium, and extends into the left hypochondrium.**
- **When a person in the supine position is asked to inspire deeply, the liver may be palpated.**

Lecture's map

- Liver.
- **Biliary system.**
- **Pancreas.**
- **Spleen.**



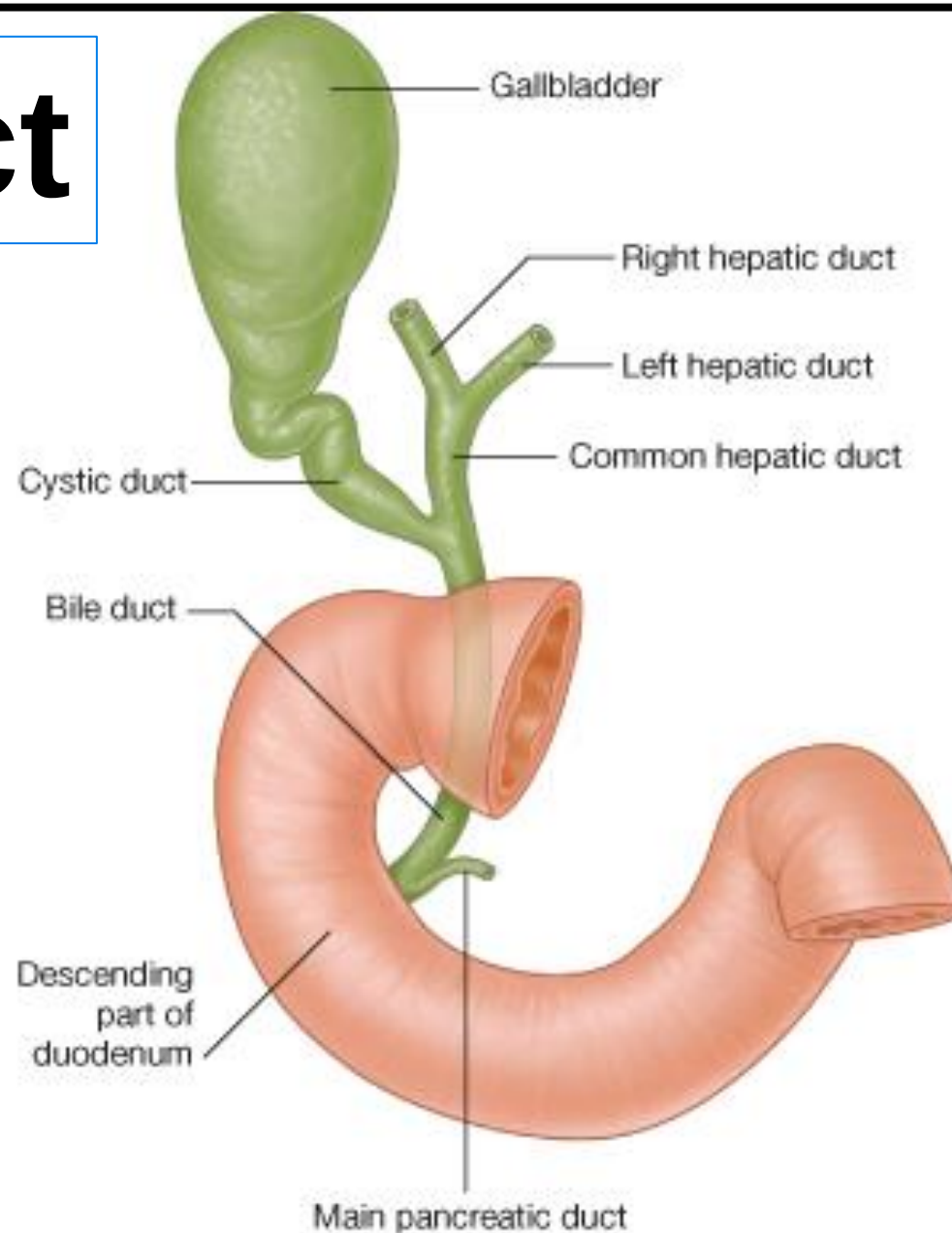
BILIARY DUCTS AND GALLBLADDER

- 
- **Bile is produced by the liver.**
 - **It is stored and concentrated in the gallbladder.**
 - **Bile emulsifies the fat, so that it can be absorbed in the intestine.**

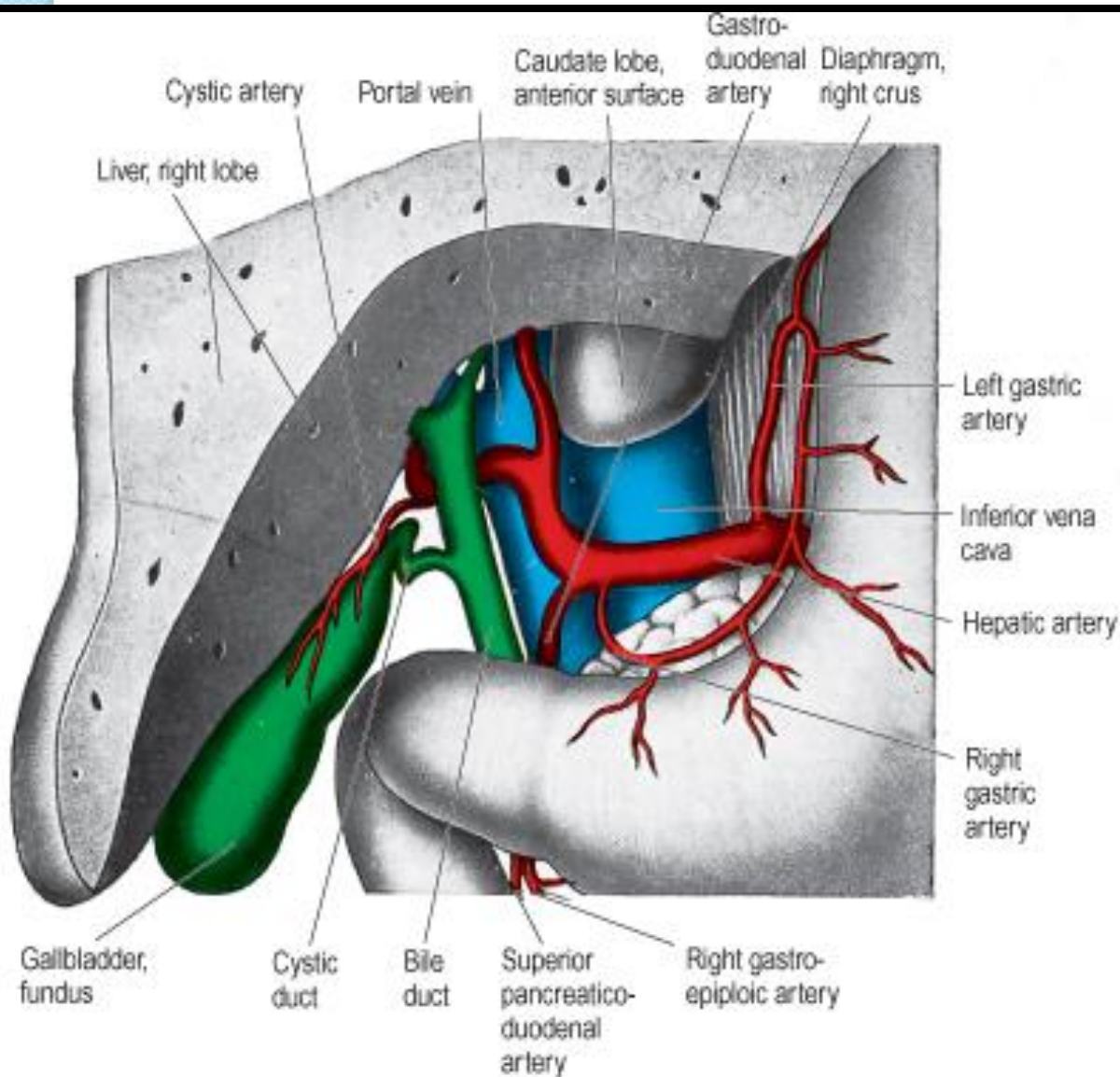
The Bile Duct

- **It forms by the union of the cystic duct and the common hepatic duct.**

Bile Duct



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The relations of the hepatic artery, bile duct and portal vein to each other

Gallbladder

- **Definition:** It is a pear-shaped sac.
- **Location:** it is on the visceral surface of the right lobe of the liver.

Gallbladder: Parts

- **Fundus.**
- **Body**
- **Neck.**

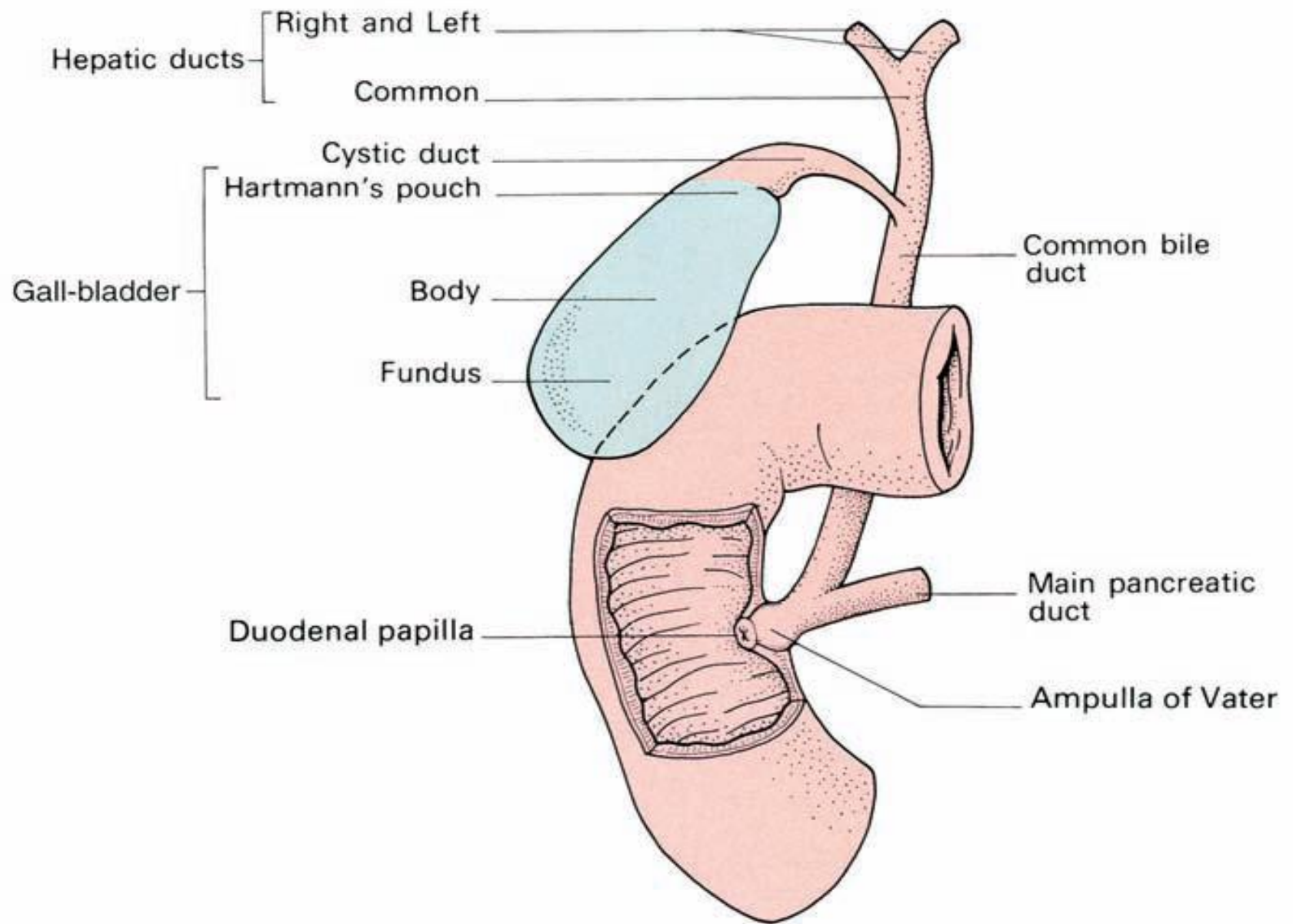


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Blood supply: the cystic artery (a branch usually of the right hepatic artery) which lies in Calot's triangle

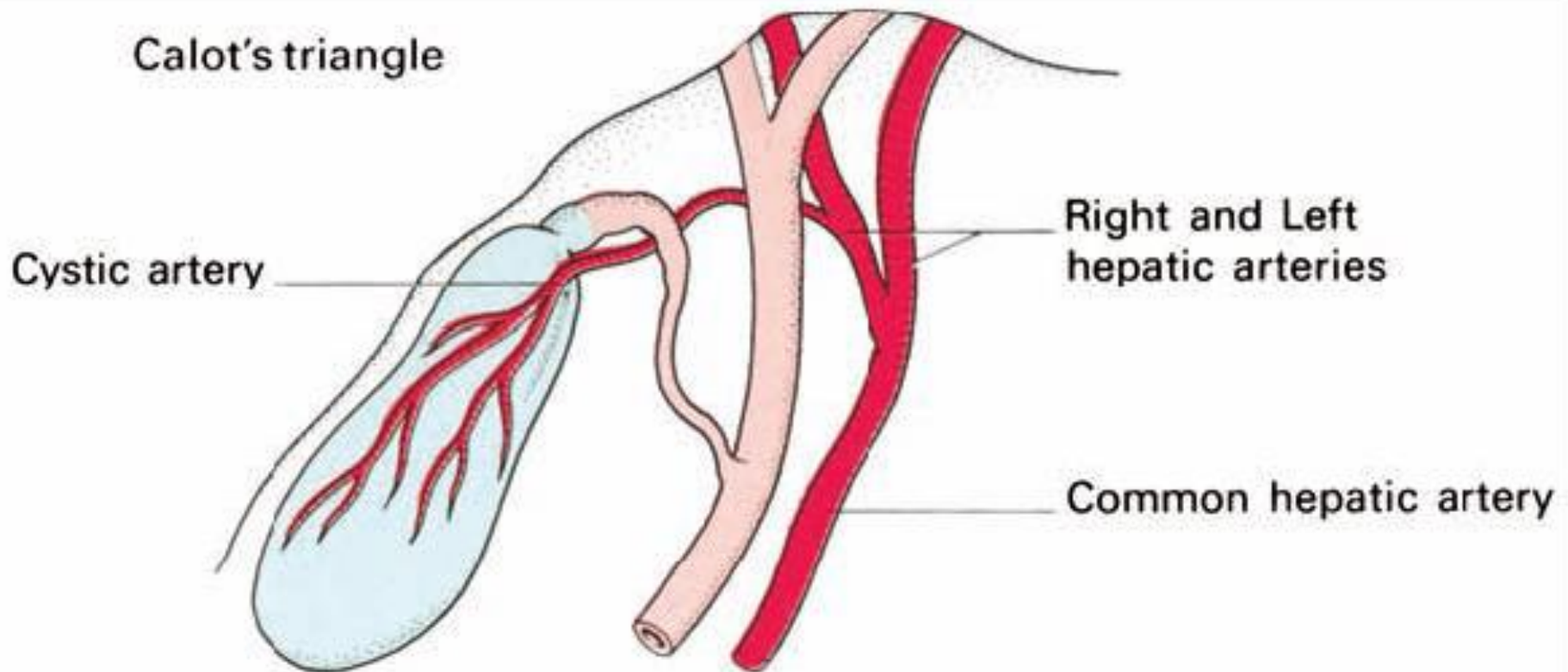


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Biography

- **Jean François Calot (1861–1941), Surgeon at Rothschild Hospital France.**

Lecture's map

- Liver.
- Biliary system.
- **Pancreas.**
- **Spleen.**



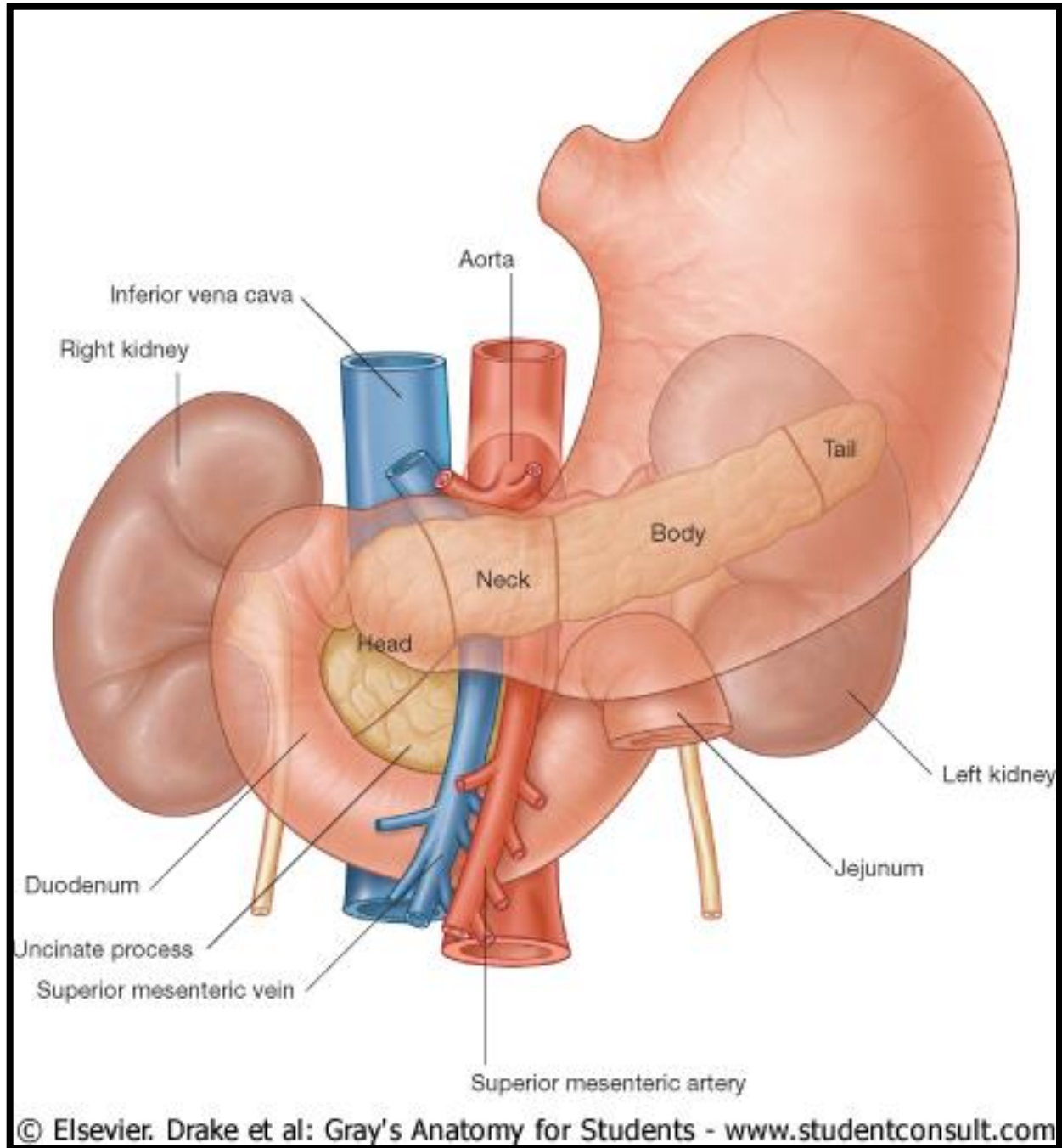
PANCREAS

Pancreas

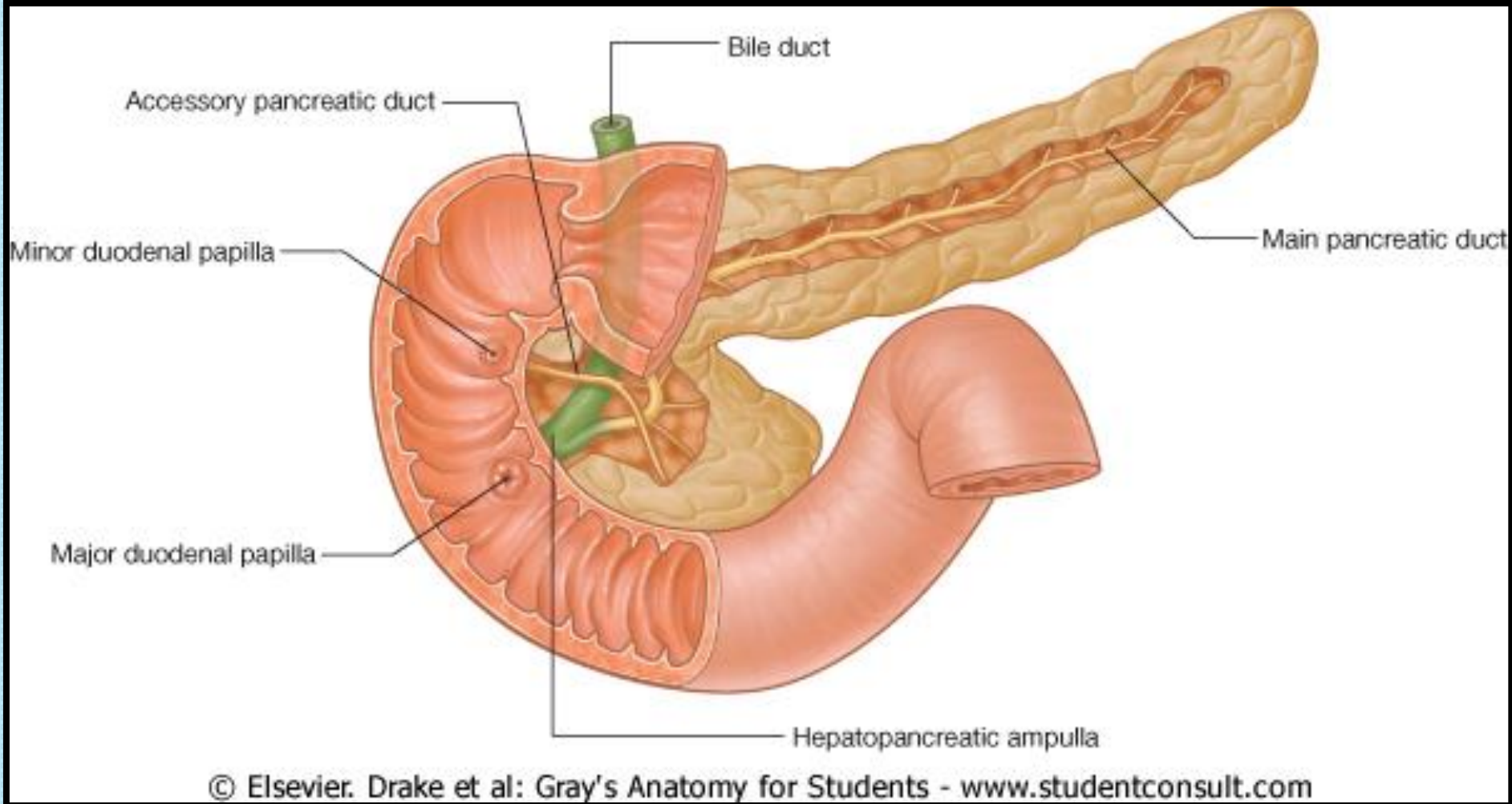
- **Definition:** it is a gland (exocrine and endocrine).
- **Location:**
 - It lies retroperitoneally and transversely across the posterior abdominal wall.
 - Posterior to the stomach.
 - Between the duodenum on the right and the spleen on the left

Parts Of The Pancreas

- **Head.**
- **Neck.**
- **Body.**
- **Tail.**



The head is the expanded part of the gland that is embraced by the C-shaped curve of the duodenum to the right of the superior mesenteric vessels



The **uncinate process** projects from the lower part of the head posterior to the superior mesenteric vessels.

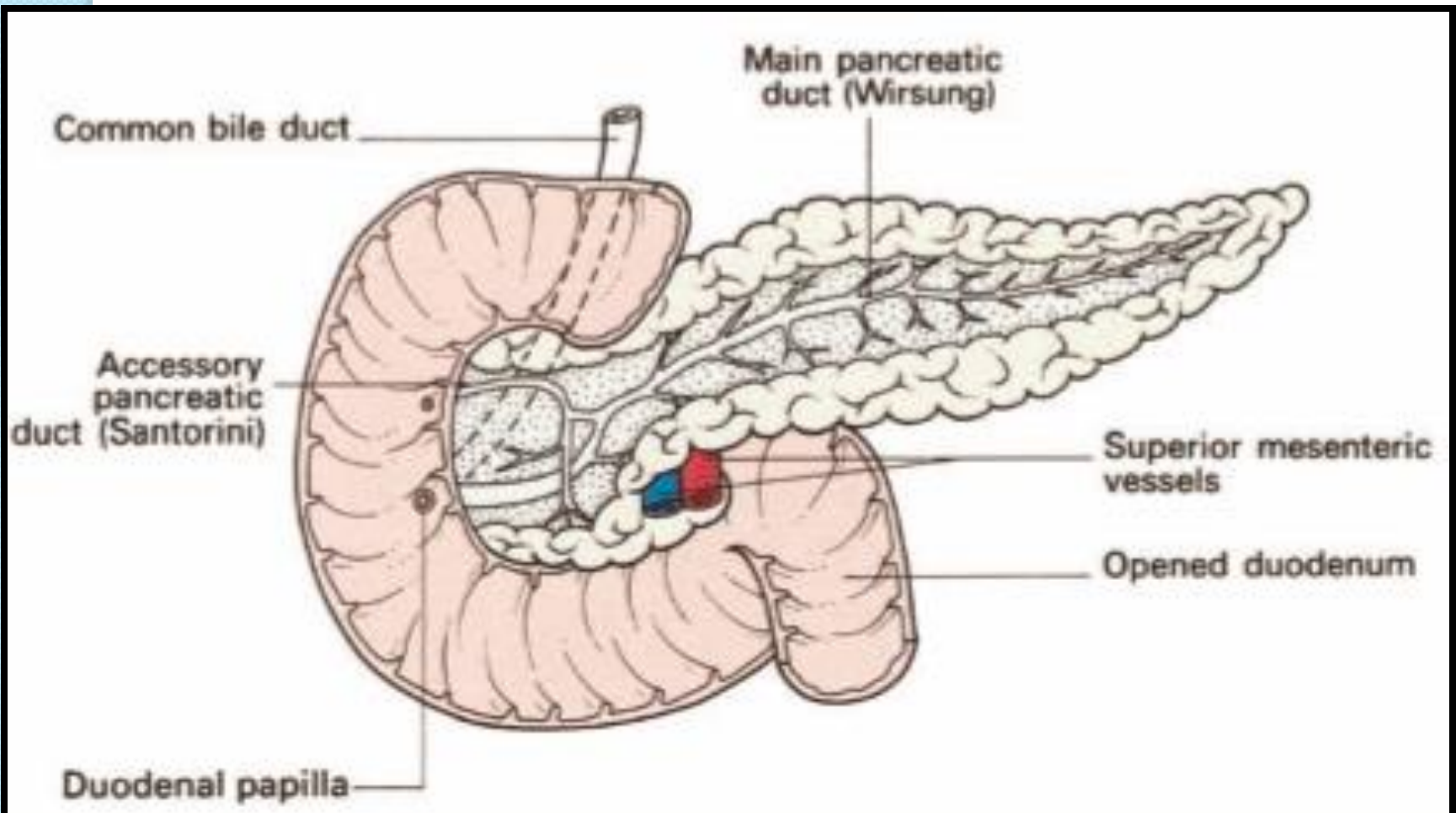


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**Posterior to the neck of the pancreas,
the superior mesenteric and the splenic
veins join to form the portal vein**

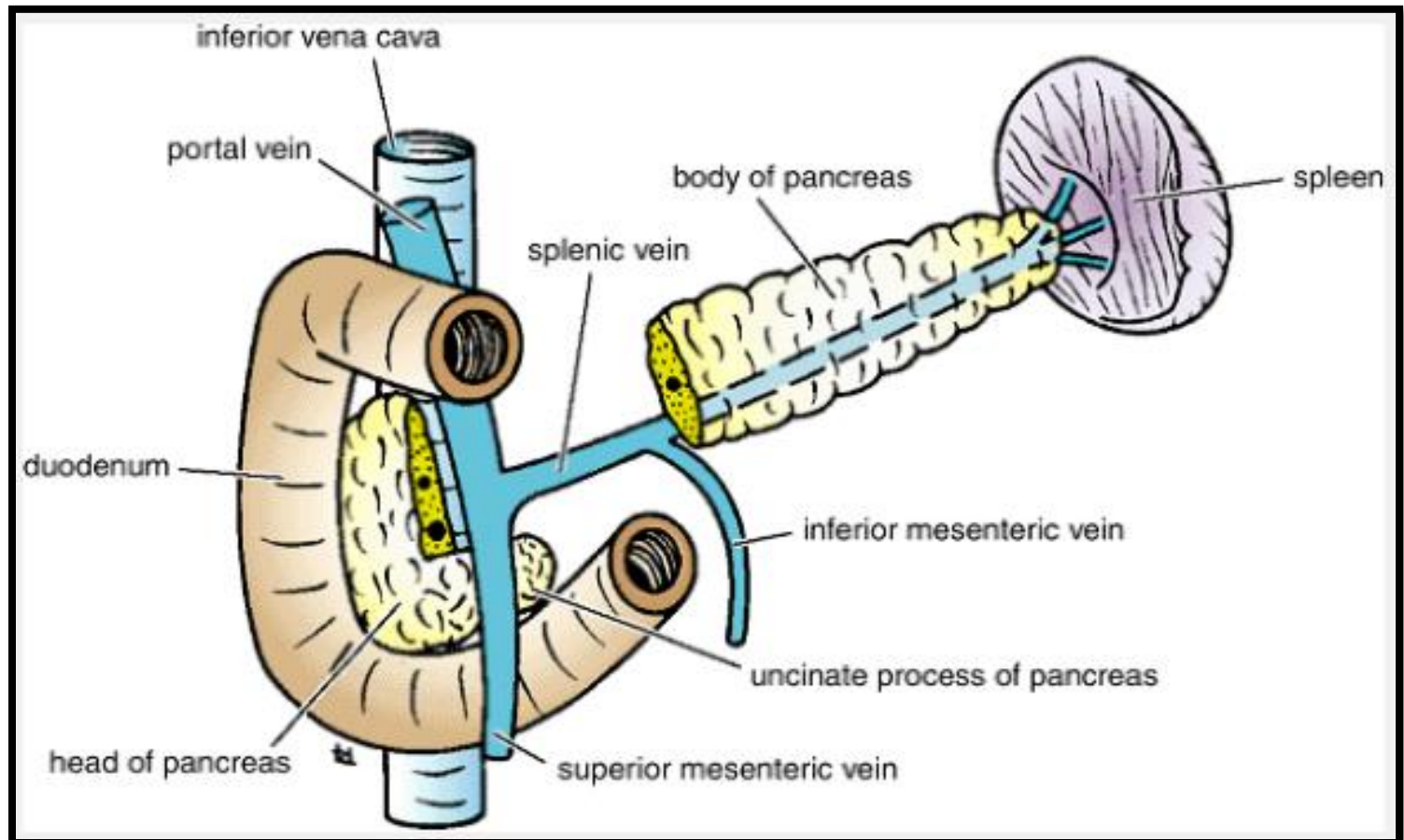
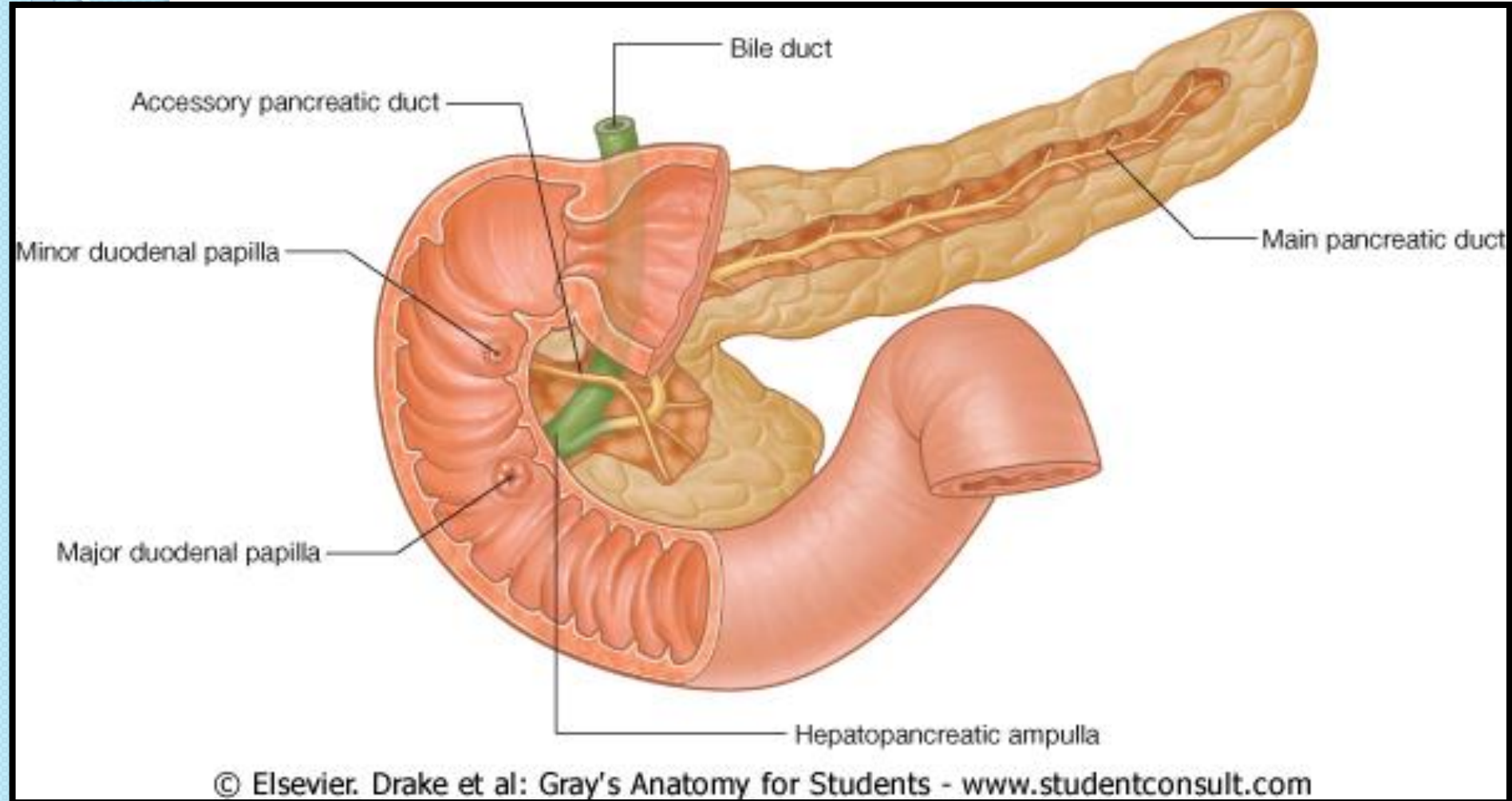
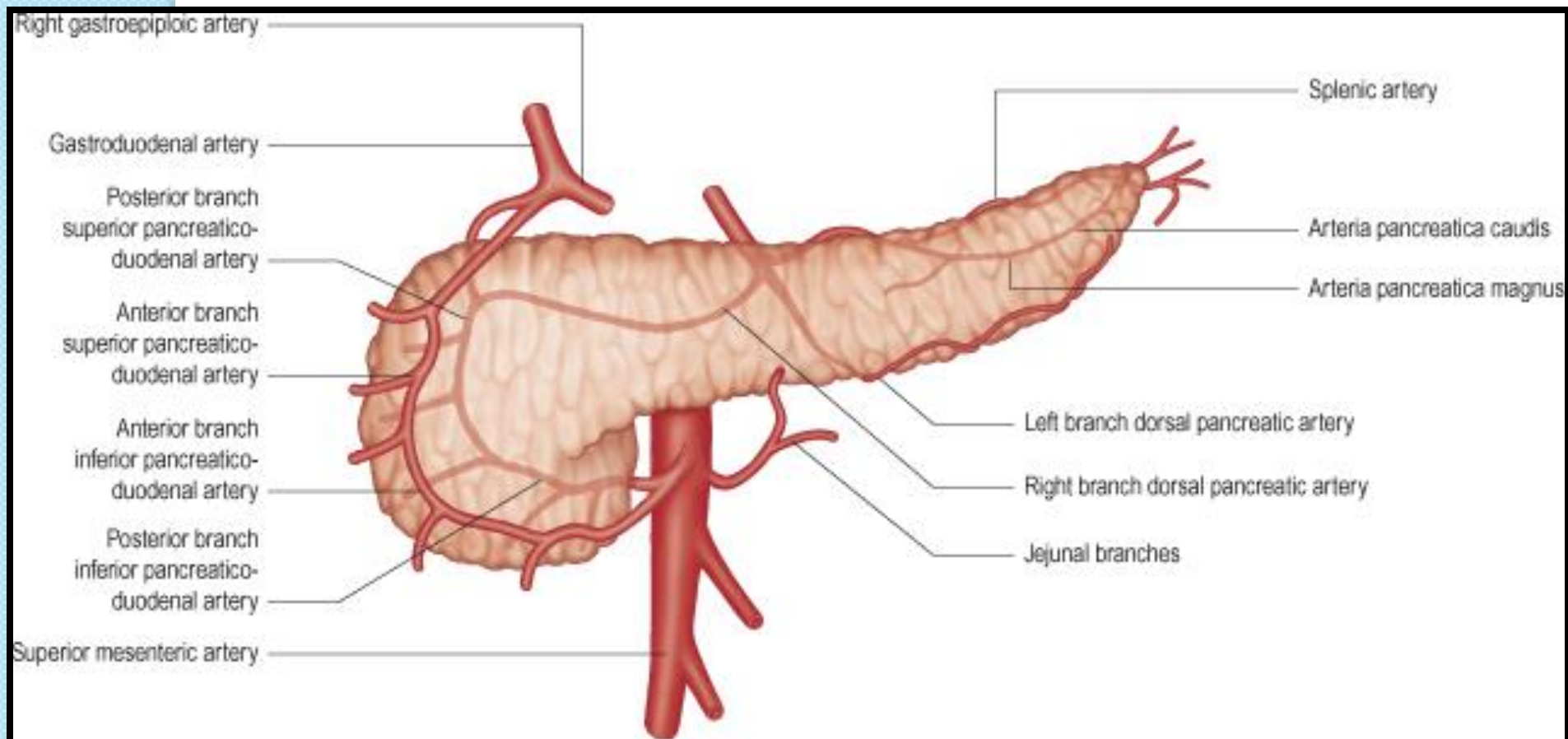


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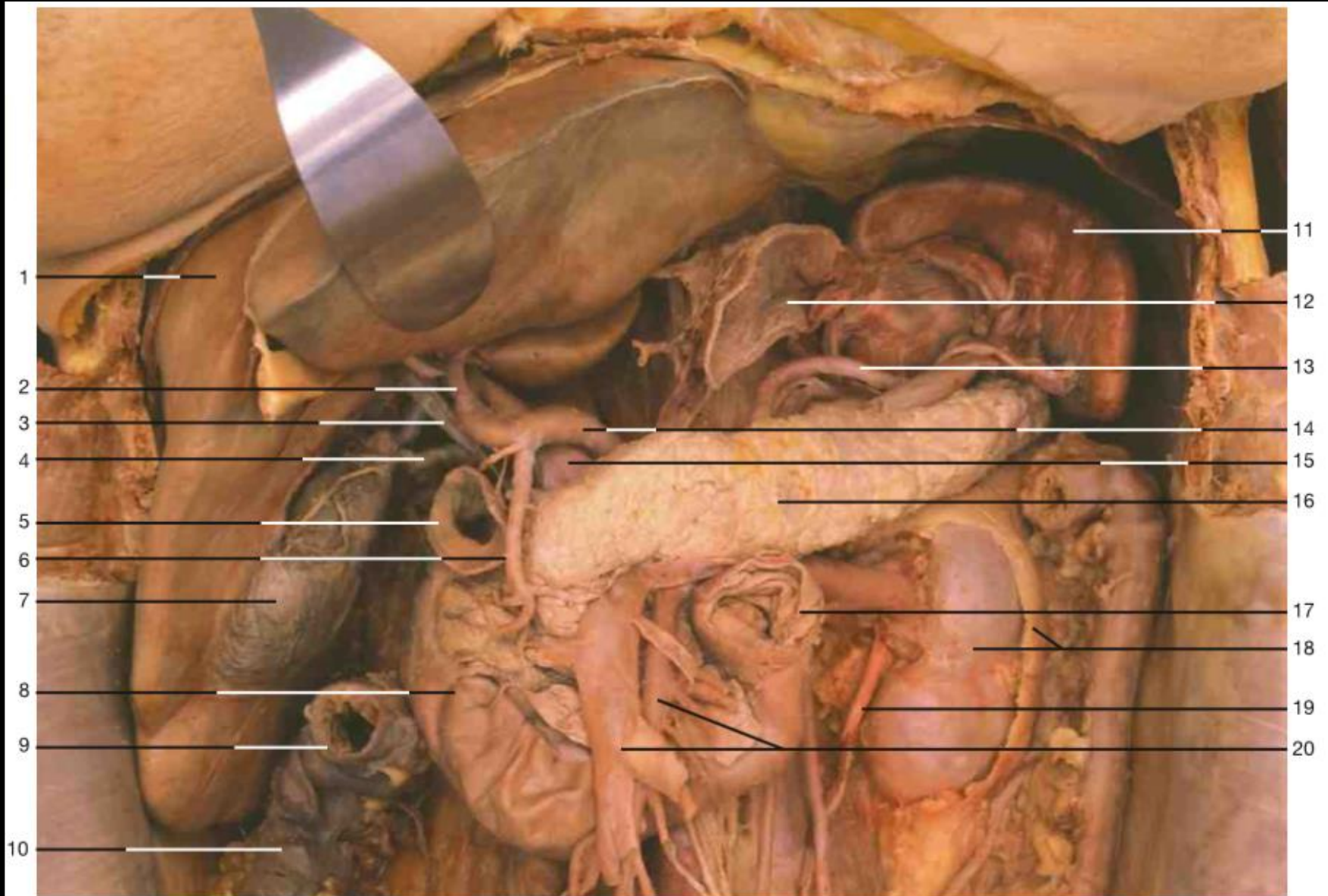
Pancreatic duct



Blood Supply



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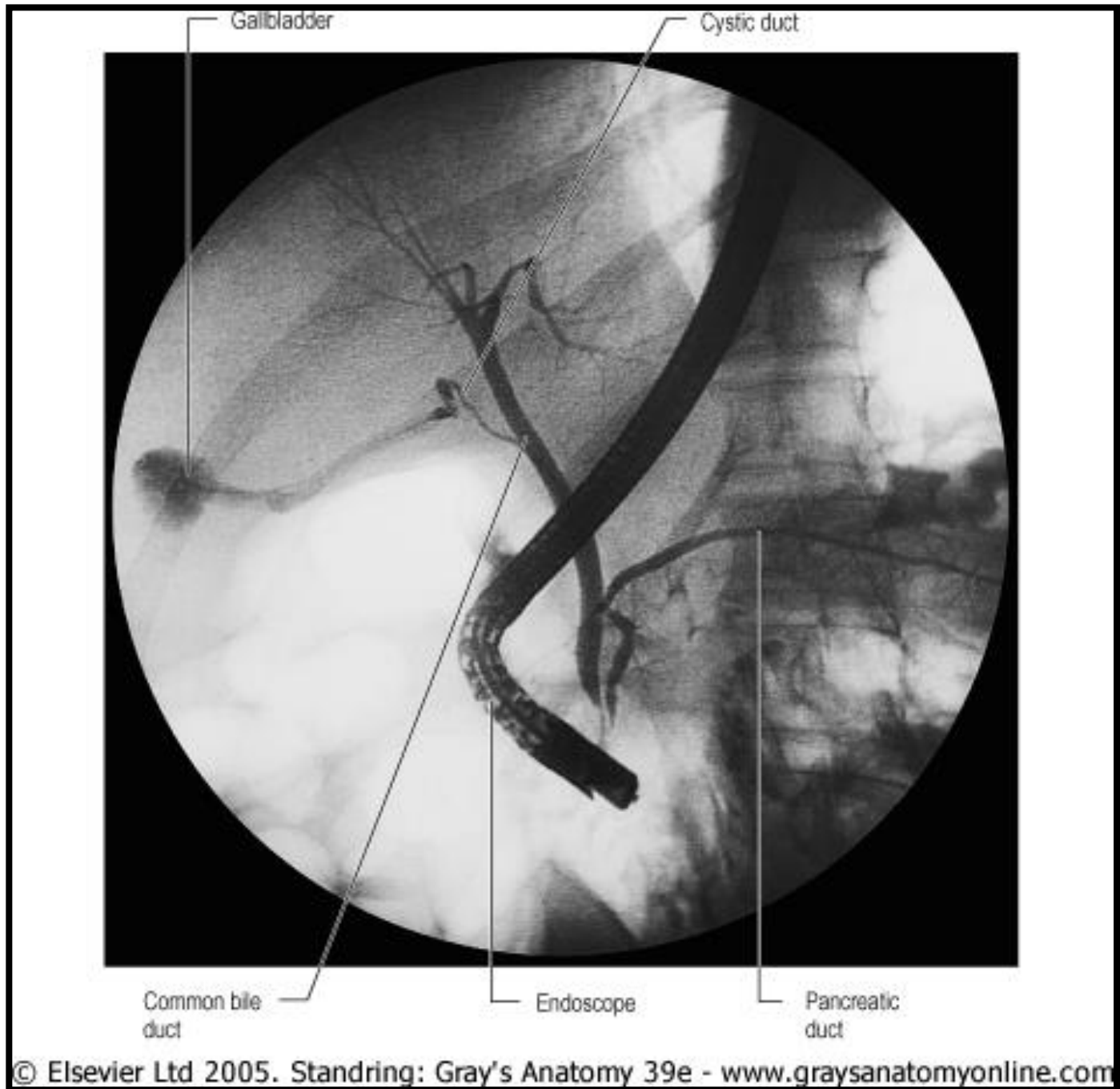
Upper abdominal organs. **Pancreas**, duodenum, and left kidney are shown. Stomach and transverse colon have been removed, liver elevated; superior mesenteric vein is slightly enlarged.

In The Previous Image

- 1 Liver
- 2 Hepatic artery proper
- 3 Hepatic duct
- 4 Cystic duct
- 5 Pylorus
- 6 Gastroduodenal artery
- 7 Gallbladder
- 8 Duodenum
- 9 Transverse colon (cut)
- 10 Ascending colon
- 11 Spleen
- 12 Cardia
- 13 Splenic artery
- 14 Common hepatic artery
- 15 Portal vein
- 16 **Pancreas** (body)
- 17 Duodenojejunal flexure
- 18 Kidney (with capsula adiposa)
- 19 Ureter
- 20 Superior mesenteric artery and vein

Radiology: ERCP

- **Endoscopic retrograde cholangiography (ERCP) is done by first passing a fiberoptic endoscope through the mouth, esophagus, and stomach. Then the duodenum is entered and a cannula is inserted into the major duodenal papilla and advanced under fluoroscopic control into the duct of choice (bile duct or pancreatic duct) for injection of radiographic contrast medium.**



Lecture's map

- Liver.
- Biliary system.
- Pancreas.
- Spleen.



SPLEEN

Spleen

- **Definition:** It is the largest of the lymphatic organs
- **Location:** It forms the left lateral extremity of the lesser sac.

Spleen: Location

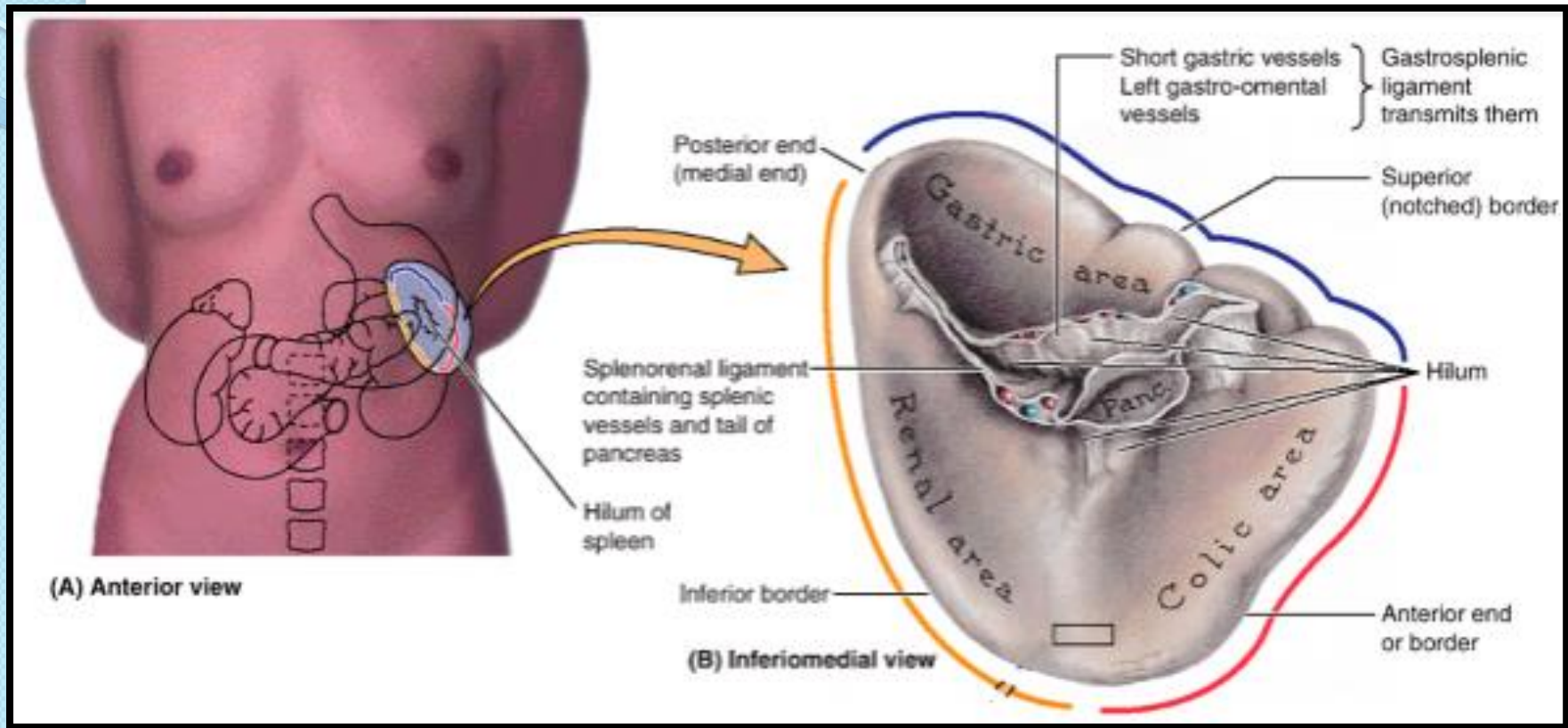
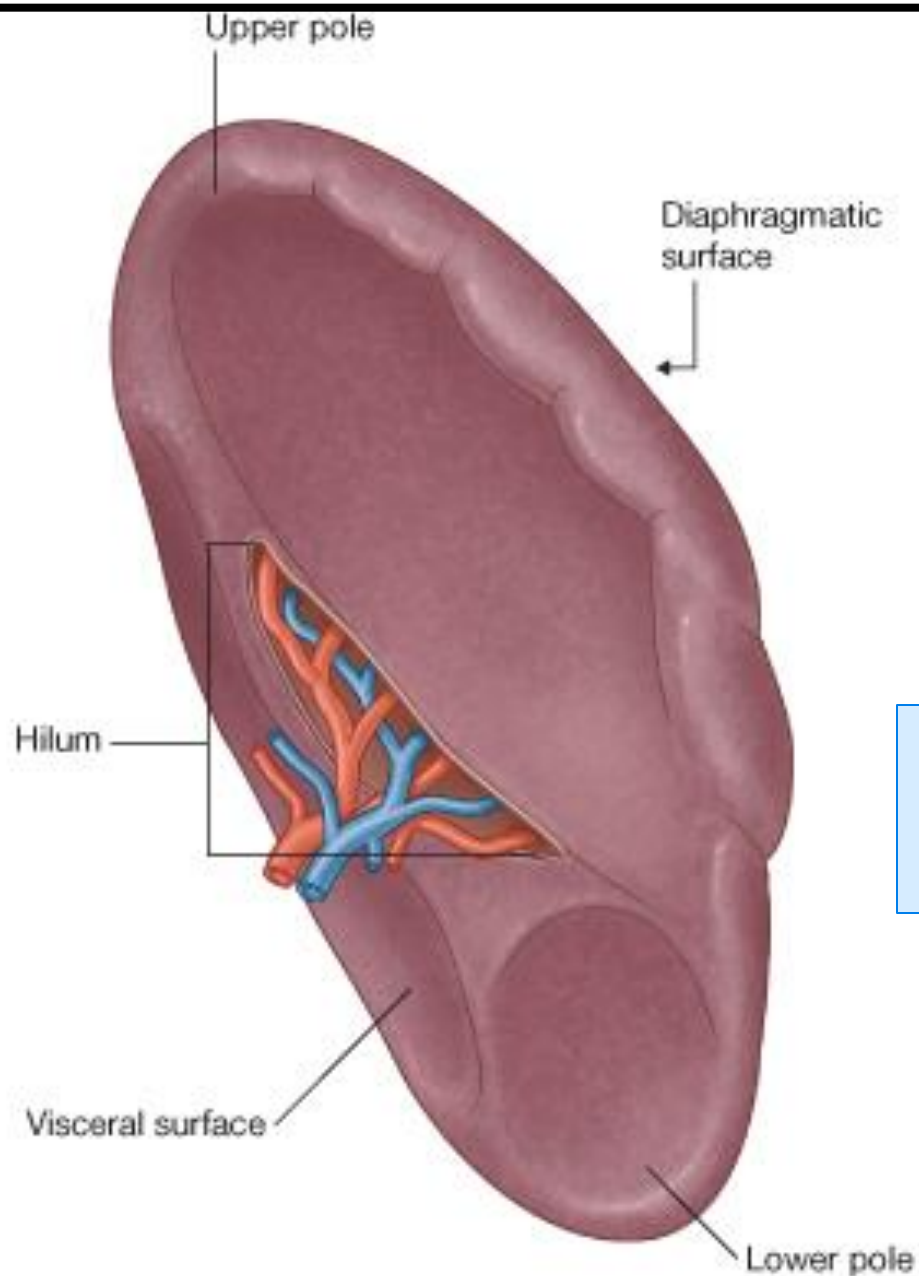


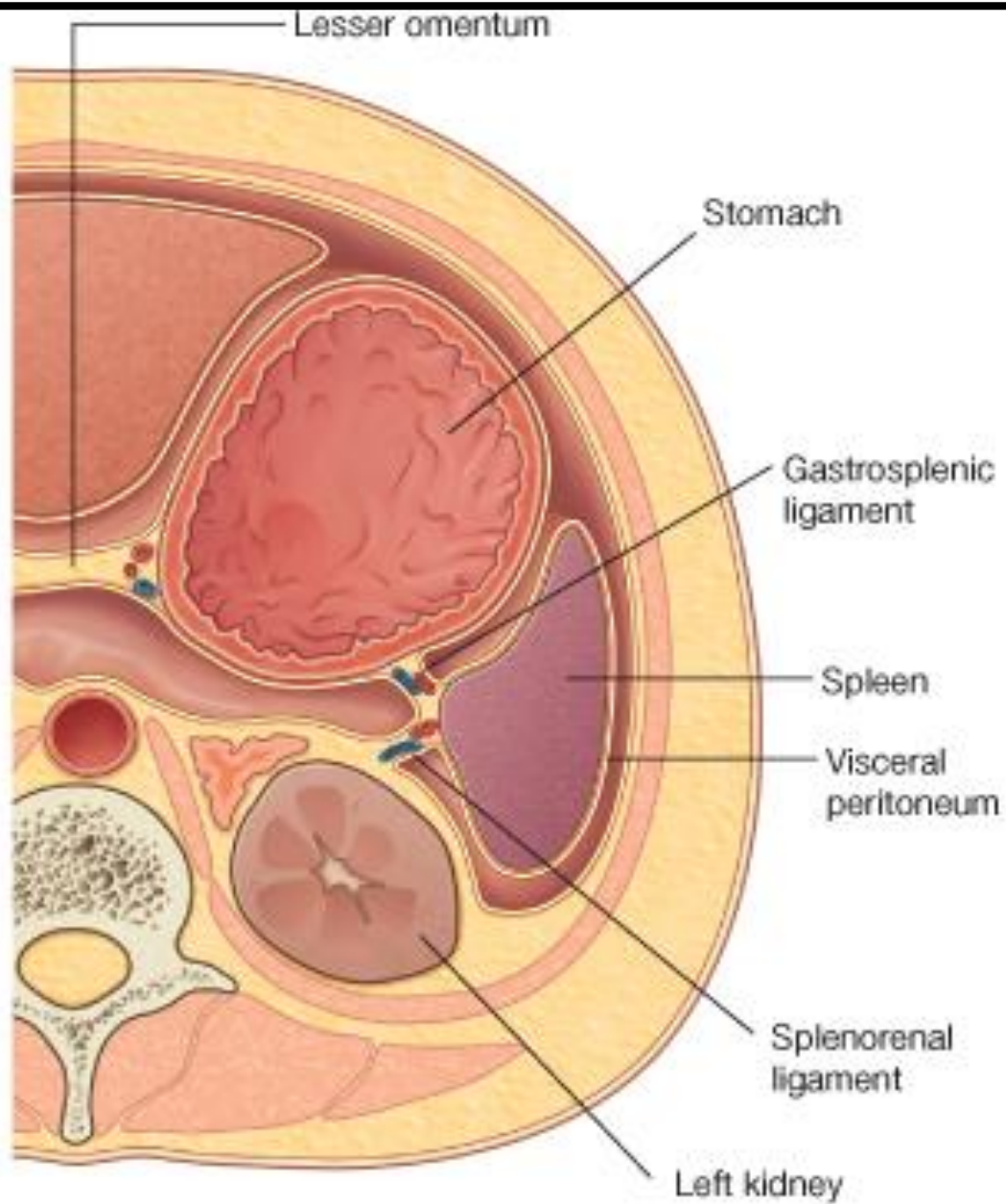
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Surfaces

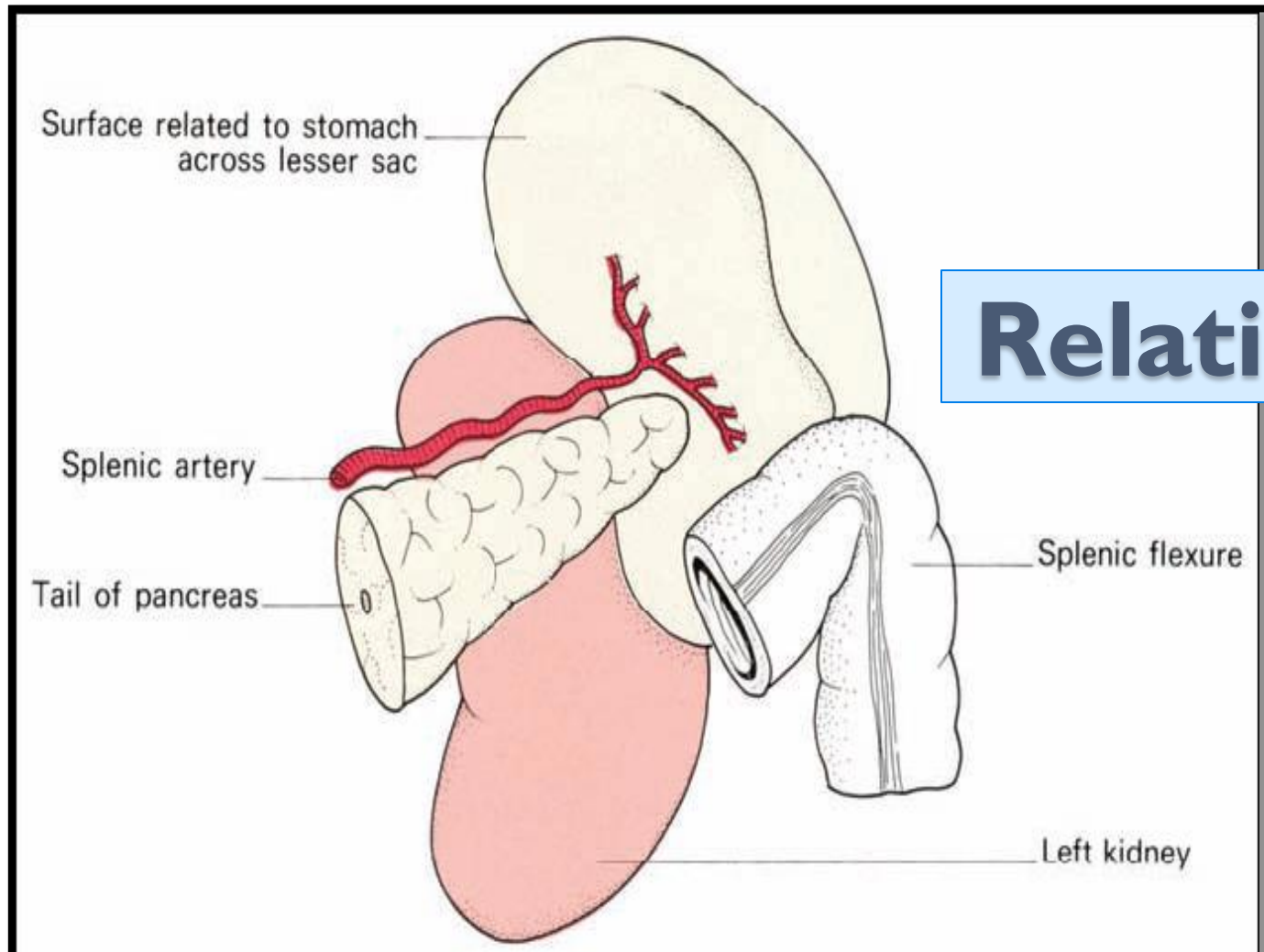
Spleen: Relations

- **Posteriorly**: the left diaphragm, separating it from the pleura, left lung and the 9th, 10th and 11th ribs.
- **Anteriorly**: the stomach.
- **Inferiorly**: the splenic flexure of the colon.
- **Medially**: the left kidney.



Relations

The tail of the pancreas abuts against the hilum of the spleen



Relations

Spleen: Blood supply

- **Artery: The splenic artery.**
- **Vein: The splenic vein is joined by the superior mesenteric to form the portal vein.**

Surface Anatomy

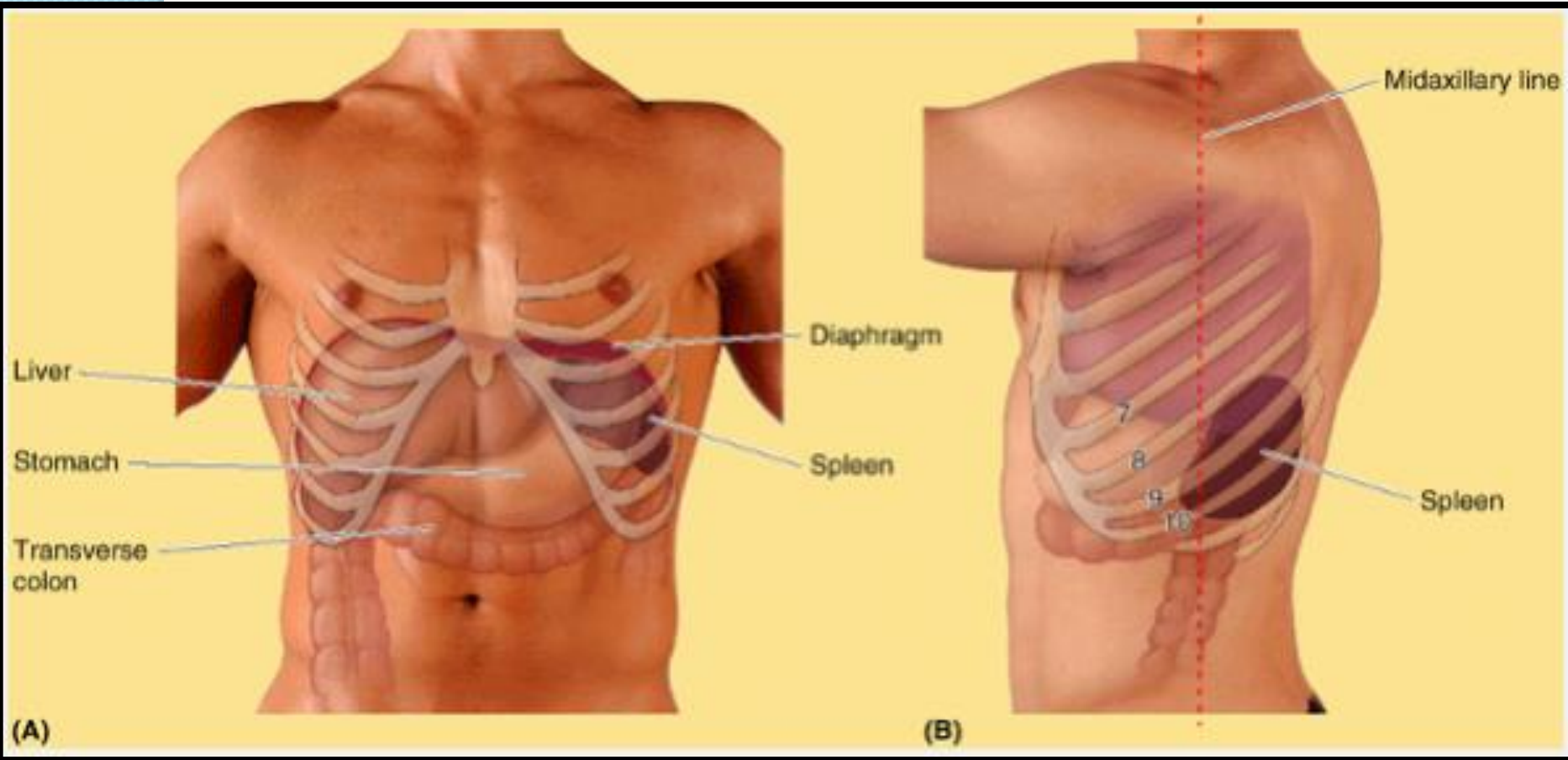
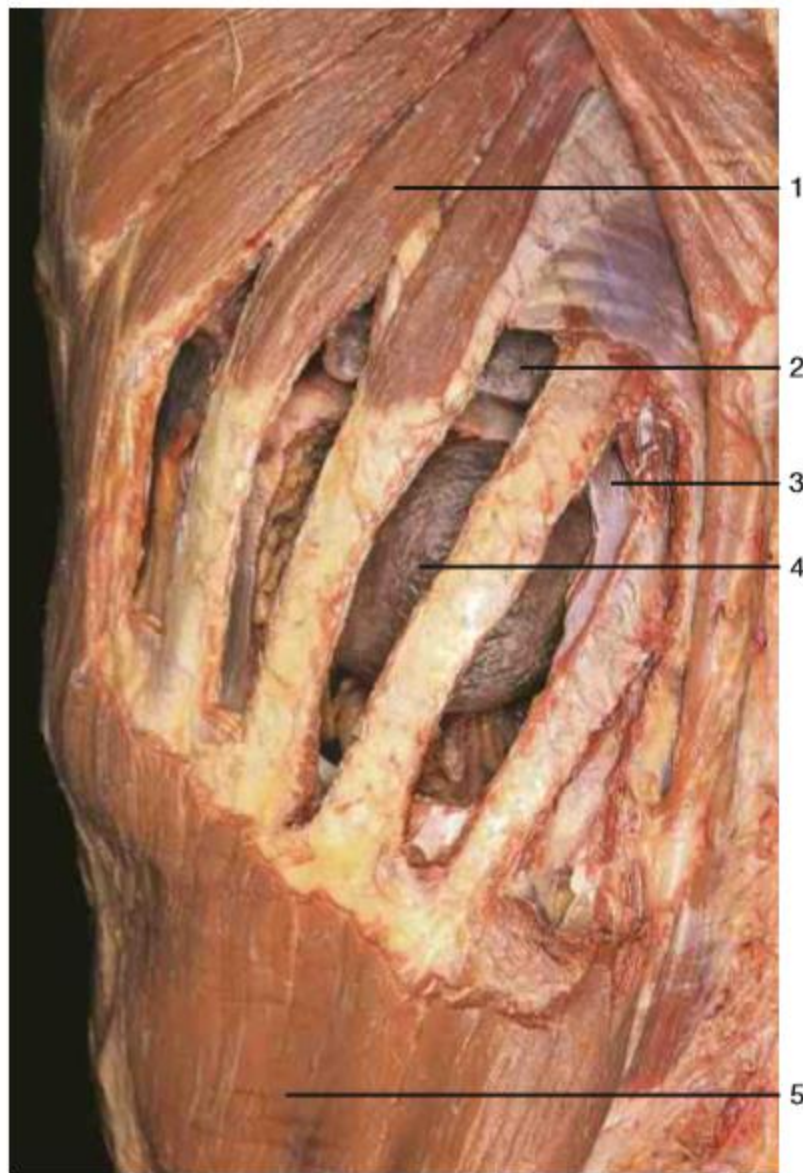


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- 1 Serratus anterior muscle
- 2 Left lung
- 3 Diaphragm
- 4 Spleen
- 5 External abdominal oblique muscle

Location of the spleen in situ (left-lateral aspect).
Intercostal spaces and diaphragm have been fenestrated.

Surface Anatomy: Spleen

- **The spleen follows the contour of rib 10 and extends to just posterior to the midaxillary line.**

Clinical Anatomy: Splenomegaly

- **When the spleen is diseased, it may enlarge to 10 or more times its normal size (splenomegaly).**
- **The spleen is not usually palpable in the adult; generally, if its lower edge can be detected when palpating below the left costal margin at the end of inspiration it is enlarged about three times its normal size.**

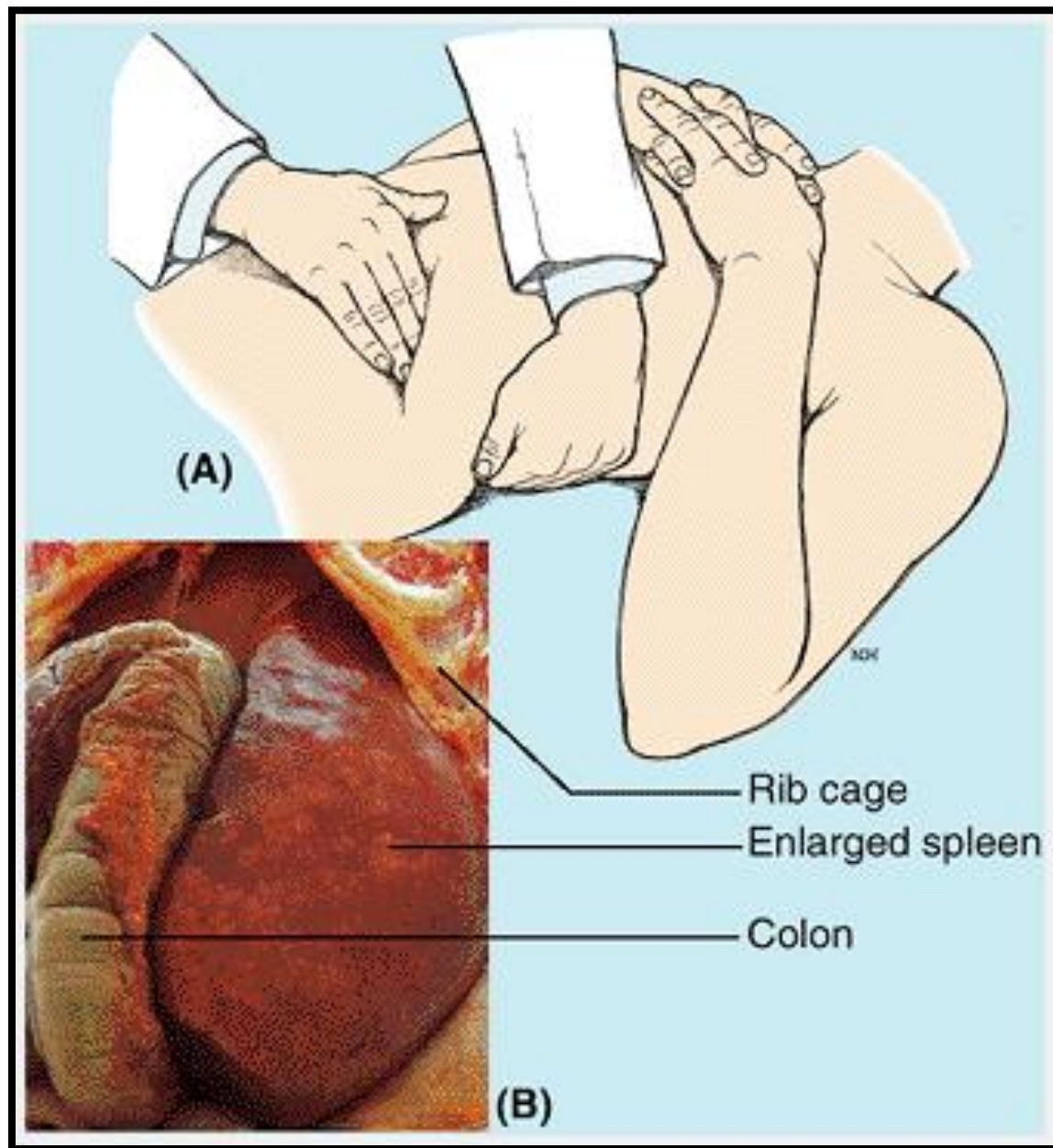
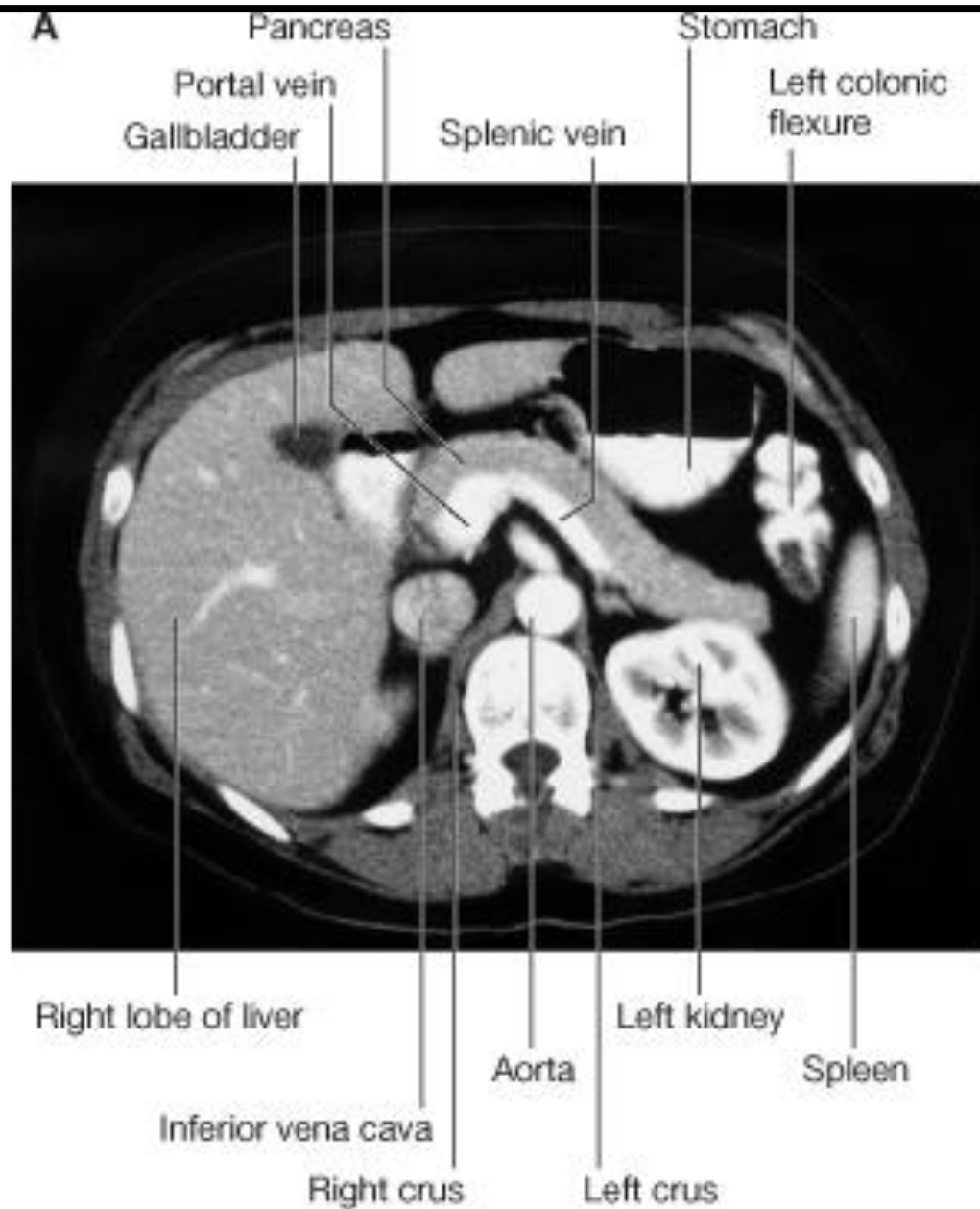


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Radiology: Abdominal CT



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Summary: Lecture's map

- **Liver.**
- **Biliary system.**
- **Pancreas.**
- **Spleen.**

Please Try To Answer The Following Question:

- **Where does the portal vein form with regards to the following parts of the pancreas?**
 - a) Close to the tail.**
 - b) Around the head.**
 - c) Posterior to the neck.**
 - d) Anterior to the body.**
 - e) Inferior to the uncinate process.**

Please Try To Answer The Following Question

- **The spleen:**

- **Is retroperitoneal.**
- **Is normally palpable.**
- **Is related to the right 9th to 11th ribs.**
- **Is located in the left hypochondrium.**
- **Receives blood from the superior mesenteric artery.**

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